Gas Journal

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Vol. 211. 87th Year. LONDON, JULY 24, 1935. No. 3766. Price 1s.

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CONTENTS

EDITORIAL NOTES.

Bottled Gas 203
Illumination Problems 203
Selling Heat Service 204
Publicity 204
The Five-Day Week 205

Personal 205
Forthcoming Engagements 205
News in Brief 206
Correspondence—
Disposal of Gas Liquor—Powers of Local Authorities 206
Amalgamation and Grouping—
Severn Valley and Dawley 207
The Institution of Gas Engineers—"Refresher" Course 207
Cas at the Sutton Carnival 207
Cumberland and Westmorland Gas Managers' Association 207
Electricity Failures in the House 207
Architects and Gas 207
Education and Examinations—Statistical Schedule and Arrangements for 1936 . . 207
The Gas Industry and the "Special Areas." By Eileen Murphy 208
The Great Gas Refrigerator Campaign . . 209
International Commission on Illumination—Ninth Plenary Meeting in Berlin and Karlsruhe 210
The Domestic Coke Market and the Gas Industry. By John Roberts, D.I.C. 211
Heat Transmission in Waste Heat Boilers. By P. St. George Kirke, M.A.(Cantab.) . 213
Wales and Monmouthshire Association of Gas Engineers and Managers—
Special Meeting at Cardiff 216
Visit to the East Moors Works 216
Wales and Monmouthshire—*continued.*
The B.C.G.A. Scheme for the Interchange of Displays. By W. R. Oliver . . . 217
The Klönne Waterless Gasholder. By W. A. Harper 218
Gas in the Working Class Home 220
French Gas Industry—
Review of the 57th Congress of the Union Syndicale de l'Industrie Technique du Gaz en France 221
Reports of Committees 221
The Tottenham Gas Order 222
Activity at Greenock—Vertical Retort Plant Reconstruction 223
Gas Markets and Manufactures—
Stock Market Report 224
Current Sales of Gas Products 224
Contracts Advertised To-Day 224
Gas Undertakings' Results 224

Stock and Share List 225

For Advertisers' Index see End of "JOURNAL"—PAGE 231.

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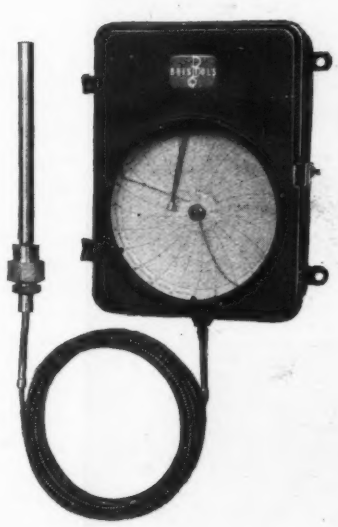

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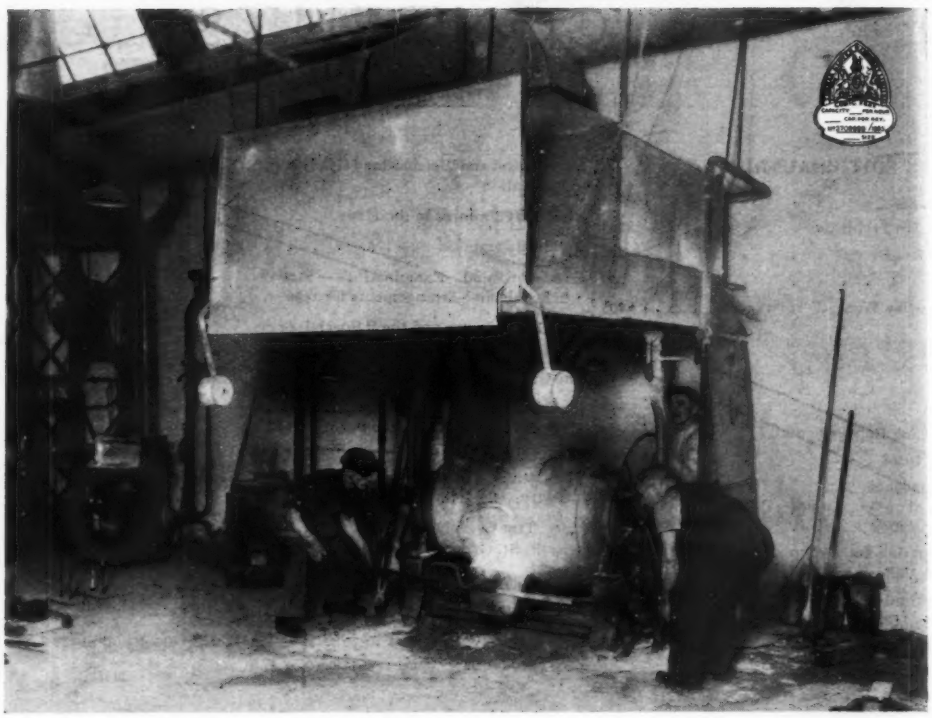

A Gas-fired furnace. One of the many uses for gas in meter making

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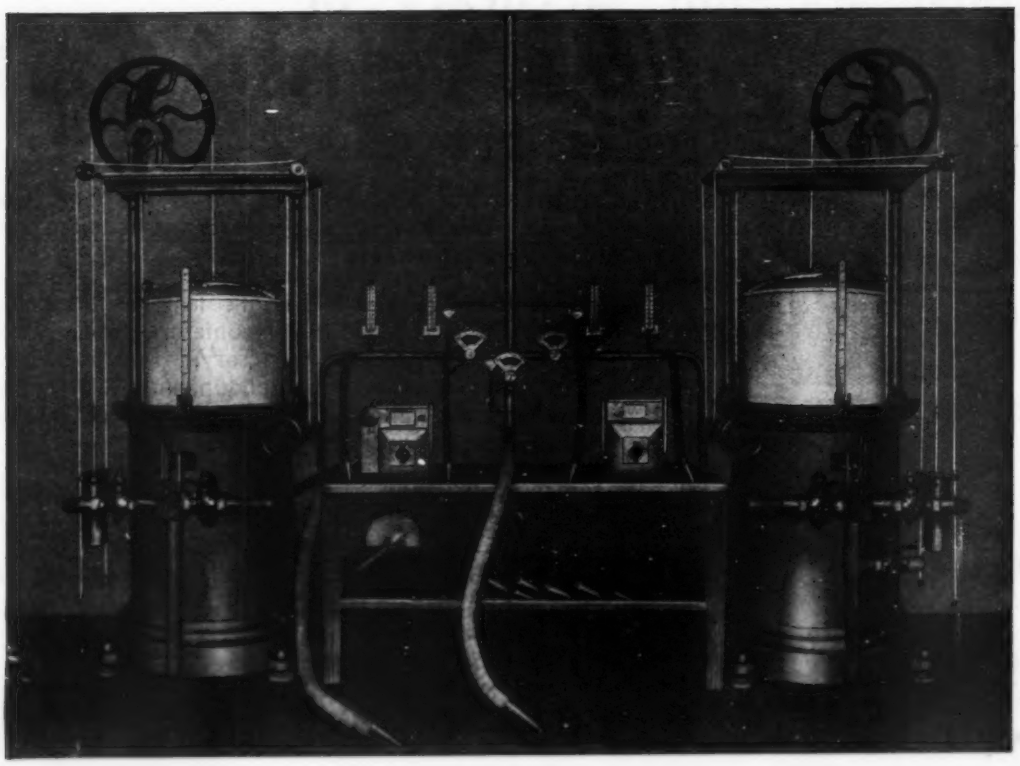

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Gas Journal

JULY 24, 1935

Vol. 211. 87th Year No. 3766

Editorial Notes

Bottled Gas

A NEW development—as far as this country is concerned—is taking place in connection with the supply of bottled gas, and it is of first-rate interest to the Gas Industry. The entire scheme is simple, and it should help gas undertakings to add to their books thousands more "gas minded" consumers. The "bottled gas" is a mixture of butane and its homologues which is sold in liquid form in containers of comparatively light construction. A domestic installation consists of two containers and a pressure governor. One container is put into service while the other is held in reserve. When the service container is empty the consumer unscrews a union nut from the empty container and screws it on to the full container, the operation taking less than a minute. He then notifies his local distributor, who picks up the empty container, delivering a full container in its place—as simple as exchanging a two gallon can of petrol. A container when full weighs 49 lb. and holds 28·6 lb. of liquid butane, equivalent to 7 therms. In no sense is this "bottled gas" in competition with town gas. Installations of bottled gas would be made only where no ordinary gas supply is available. Acting as distributors, however, gas undertakings could supply isolated rural communities with an excellent service until such time as it becomes possible to extend their mains. In cases where extensions of mains in the near future are contemplated, then houses could be carcassed with pipes adequate to deal with town gas, so that change-over from bottled gas to ordinary supply will not necessitate alteration to pipework. The Company sponsoring the scheme—the Calor Gas Distributing Company, Ltd.—is fully alive to the desirability of this.

With this bottled gas—marketed under the designation "Calor Gas"—the rural consumer can enjoy all the amenities of a town gas supply. He can have the benefit of incandescent gas lighting, avoiding all the objectionable features which characterize the use of oil burners, such as trimming wicks, filling reservoirs, pricking burners, and so on; and he can have the benefit of speedy cooking—a highly important consideration and a strong selling point in favour of gas.

We may mention that the gas pressure in a calor gas container at normal atmosphere pressure is 22 lb. per sq.in. The vapour pressure of butane at 122° F. is 78·6 lb. per sq.in.; and we are informed that a cylinder tested for the National Physical Laboratory did not reach bursting point until over 700 lb. per sq.in. pressure had been reached. The pressure regulator, which, as remarked, forms part of the equipment, is adjusted to give a pressure at the outlet to the burners of 12 in. water column.

The Modern Gas and Equipment Company intends to set up filling station depôts in different parts of the country, the plan being that a specially designed lorry, capable of carrying 300 containers, will serve the distributors. The whole scheme appears to us to be well thought out, and worthy of the Gas Industry's co-operation. The Industry has everything to gain and nothing to lose by such co-operation. Certainly the progress of "bottled gas" on the Continent has been swift since its introduction.

Illumination Problems

WE are glad to say that the delegation of the British Gas Industry to the Ninth Plenary Meeting of the International Commission on Illumination, held in Berlin and Karlsruhe this month, was the biggest on record; and the keenness of the members is bound to contribute to the science of illumination in general and to the progress of gas in particular. The delegates, who included the President of The Institution of Gas Engineers, Colonel Carr, and Mr. Alexander, were led by Mr. W. J. A. Butterfield, with Mr. F. C. Smith acting as Deputy-Leader and Secretary; and on all sides the leadership of Mr. Butterfield was very greatly appreciated. The delegates, too, were full of praise and appreciation of the arrangements made for both work and recreation by the German National Committee. In Berlin the Reichstag was placed at the disposal of the Commission, while in Karlsruhe the new buildings of the Technical University were made available.

Apart from the business meetings, the delegates were able to enjoy several interesting and useful visits. One of these was to the Zeiss Ikon works and laboratories, where the manufacture of glass reflectors for use in gas street lighting installations was seen. It was there that Dr. C. G. Klein gave a demonstration of methods of assessing visibility in the streets and evaluating glare—eminently practical methods taking into account the effect of glare on the speed of recognition of objects. In Germany great attention is being paid to the problem of eliminating glare, and this is well exemplified in the

street lighting of Cologne, Berlin (where, by the way, 80% of the lighting is by gas), and Karlsruhe. Opal shades are being employed to cut down the intensity of the candle-power near the horizontal to values of a lower order than those common in this country.

It is satisfactory that Great Britain has been nominated as the Secretariat Committee for Street Lighting and Glare—recognition of the value of the work of the British Committee on Street Lighting and of the National Physical Laboratory on Glare. We emphasize the importance of the work of the various Secretariats, for we feel that it is insufficiently appreciated. The success of the triennial meetings of the International Commission does in fact depend on this work. The meetings could not be justified unless the subjects for discussion had been fully prepared during the three-year period. Each secretariat report depends on the co-operation of each National Committee and becomes, with effective co-operation, an account of the work accomplished all over the world during the previous three years. The meeting itself provides the occasion for clarification of any of the points dealt with, and for a direct exchange of experiences and views between the leading experts. As a result of study of the reports and discussions, the Commission, by its resolutions and recommendations to National Committees, not only sets the seal of international decision on the agreed findings of the secretariat reports, but formulates a programme for future work without preventing the development of independent work in each country.

In regard to the Street Lighting Committee of the British Standards Institution, the Gas Industry has proper representation, but we feel there should be greater co-operation between our Industry and the British National Committee. Certain aspects of illumination are peculiar to gas and constitute subjects which might well be considered by the National Committee. The delegation to the meeting of the International Commission have accomplished good work in making the voice of the Gas Industry heard, but we could do better than we are doing at present. The fact that Great Britain is the Secretariat Committee for Street Lighting and Glare adds point to our contention.

On later pages is a report of the meeting of the Commission.

Selling Heat Service

We have said a great deal about the Gas Industry as a great heat service selling two first-class smokeless fuels, apart from other products; an industry selling smokeless therms—millions of them in gaseous and solid form. A month or two back we remarked: "If we are satisfied with the magnitude of the Gas Industry in 1935, we are sadly lacking in imagination. If the Industry properly appreciated its enormous scope there would be a startling transformation of its activities." In regard to the sale of coke for the domestic open firegrate we have pointed to the two methods of attack—one to produce a coke specially suited to the ordinary coal burning grate, the other to provide a coke grate complete with gas ignition which will consume with every satisfaction coke as at present produced by gas undertakings. We take it for granted, of course, that this coke is properly prepared and graded for the market. We therefore regard it as a wise policy for gas undertakings to do all possible to push the sale of gas ignited coke grates, while, at the same time, endeavouring to produce a solid smokeless fuel for burning in the ordinary domestic grate as at present installed.

Our views are receiving more and more support. An article by Mr. John Roberts is indicative of this. At the June meeting of The Institution of Gas Engineers last year Mr. Roberts contributed to the discussion on the Paper on the production of smokeless fuels by Eng.-Capt. Fraser Shaw and Dr. J. G. King, of the Fuel Research Station, and his remarks were reported in the "Journal" for June 13, 1934 (p. 781). He said: "Neither that process [the one employed at Bruay] nor the processes advocated in this Paper are of very much interest to the Gas Industry in that they give you a very small output of gas, and you are essentially gas manufacturers. Solid fuel is a side-line with you, and, besides, it is not your business. It has often been said that the home of the low-temperature industry, when it comes, should be the Gas Industry and the gas-works, but here I do not agree. There are other people who are supplying the domestic consumer with solid fuel and there appears to me to be no reason why that solid fuel market should not be reserved to people outside the Gas Industry. . . . The process which really interests the Gas Industry is one which gives a good yield of gas at the same time—*i.e.*, using your high temperatures in your flues, using blends, and adopting short coking periods."

In his article to-day Mr. Roberts maintains, and we agree with him in this matter, that the Gas Industry must advance on the domestic solid fuel front. The Industry, he says, will not fulfil its function until it caters for the complete requirements of the householder in respect of solid fuel for the open firegrate, and he points to the scope for the adoption of flexible processes which can be balanced to produce high yields or low yields of gas, solid fuels, and of liquid products. "The Gas Industry," he continues, "should be the universal provider, if not purveyor, of smokeless fuel, and if it will set itself out to produce a free-burning coke suitable for use in open grates, much can be accomplished towards that end." In his view the gas engineer who does not look beyond the gasholder places his head in the sand.

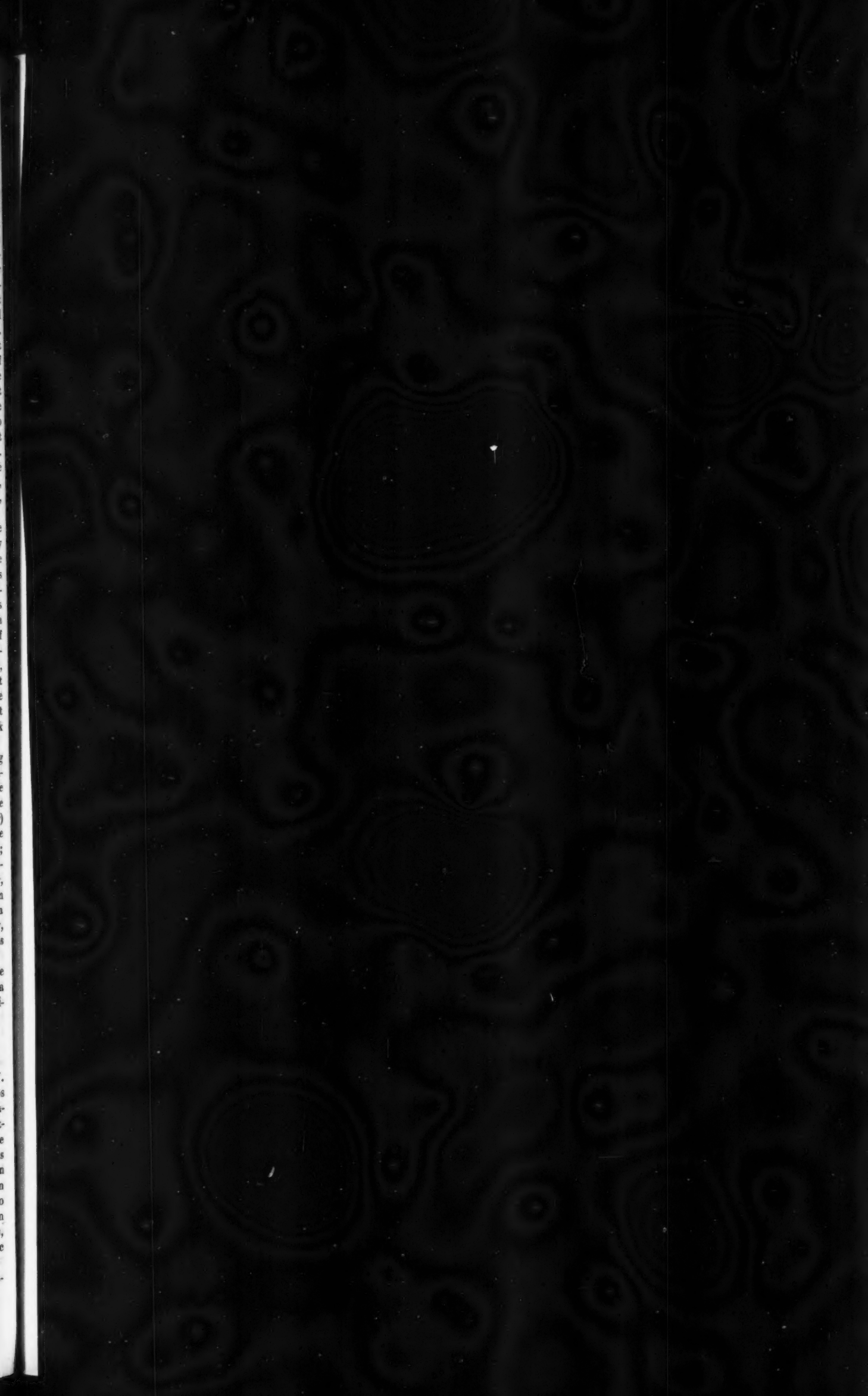
It is the idea of Mr. Roberts that a modern gas-making plant could employ four systems of carbonizing: High-temperature carbonization coupled with steaming for the production of cheap gas and cheap gas-free coke for coke boilers; medium-temperature carbonization (fast coking) for the cheap production of free-burning open-grate coke of 4% volatile content, and a moderate yield of gas; medium-temperature carbonization (slow coking), producing a smokeless fuel with about 7% of volatile matter, and a smaller yield of gas; low-temperature carbonization for the production of free-burning semi-coke, with a maximum tar yield and a minimum gas yield. Finally, "the fuels could be classified, graded, and blended so as to suit every type of domestic heating appliance."

We will leave our readers to sort all this out, once again remarking, however, that the Gas Industry is a products industry, and that the flexibility of the carbonization process is one of its greatest assets.

Publicity

In our Correspondence Columns last week Mr. J. W. Brown, Engineer and General Manager of the Barbados Gas Company, Ltd., complained of the "Lack of propaganda by the gas interests." He was speaking of lighting in general, and in particular of an article in the June issue of the *Overseas Magazine* in which electricity was given credit for the wonderful Jubilee floodlighting in St. James's Park. "For many years in my travels in many parts of the world," he remarks, "I have had to disillusion many people with regard to the illumination of Regent Street, Whitehall, and other thoroughfares, which is generally ascribed to 'brilliant electric lighting.'"

The particular instance of the St. James's Park light-



ng and the particular magazine to which Mr. Brown refers seemed to us to have been a piece of bad luck. At the same time we agree with Mr. Brown in general that our Industry does not by any means make the fullest use of its propaganda possibilities. The fact is, as we have pointed out on previous occasions, that in the newspaper world news becomes stale almost before it is published, and this we fear is not universally realized by gas undertakings. The central propaganda organization, the British Commercial Gas Association, understands, as it quite rightly should, the very special technique which is involved in "putting news across," but an essential of using this technique is that it shall have the news red hot from members. All too often the Association receives information about events after they have taken place, and this post-information is of no value to the Press. As an example, we know quite well that the B.C.G.A. received very few photographs of notable Jubilee floodlighting installations until after Jubilee week, when it was, of course, too late to make use of them. We feel that if gas undertakings had a better understanding of what news means to the Press it would be all the better for gas propaganda. The early bird gets the space.

The B.C.G.A. knows how to "dress-up" news items to make them acceptable to the Press; and it is surely up to gas undertakings to supply the Association with information while it is news. In spite of the rival attractions of the first British National Electrical Convention at Bournemouth, the seventy-second annual meeting of The Institution of Gas Engineers in London last month had quite a good Press. The reason is simply because the information was "on the tick." If all gas undertakings bore this in mind Mr. Brown would have less cause for complaint.

The Five-Day Week

Two or three particularly fine week-ends are bound to focus still further attention upon the question of the five-day week, in which, as a matter of fact, growing interest has been manifested for some time past. So far as industry in general is concerned, it is essential that a "free Saturday" should present itself as a sound economic proposition, and the "pounds, shillings, and pence" of the matter, amid varying considerations, must frequently be difficult to determine. But, without reducing the argument to "balance-sheet" exactitude, we ourselves do feel that, although it cannot be made to fit all circumstances, wherever practicable the five-day week is, broadly speaking, good business.

The tendency to-day is anyway for less and less business to be transacted on Saturdays, and the gain to the staff from a health point of view, and consequently to the standard of working efficiency, may well outweigh such small inconveniences as may result from closing down on the last day of the week. The gain to the employees directly (and to the employers, through consequent conservation of energy) is rendered still greater by the fact that ever-increasing distances separate the majority of residences from relative offices or factories. Apart from shops, cases will, of course, readily occur to mind in which Saturday closing would be difficult, if not impossible; but even then there should be ways of giving employees a five-day week in turn, which would be advantageous, on the old principle of "half a loaf."

In the case of factories and workshops there is also a great deal to be said for the five-day week, as is evident from statements contained in the recently issued annual report of the Chief Inspector. In this report, the *pros* and *cons* are summed up by the Superintending Inspector in this wise: "The advantages of the system generally appear to outweigh the disadvantages both from the standpoint of the employers and of the workers. These advantages, so far as the employers are concerned, relate mainly to (1) reduction of various overhead charges; (2) time for maintenance work during normal hours on Saturday, obviating the necessity for overtime; (3) improvement in time-keeping and reduction in absenteeism. From the workers' point of view, the advantages seem to centre round the long week-end, with increased opportunity for recreation and sport, and a possible saving on fares when any considerable distance has to be travelled." With regard to advantage (3), one particular factory is referred to where charts of absenteeism are kept, and since the introduction of the five-day week (even with the total number of hours worked remaining at 48, as before) the records have shown definite improvement in this respect.

Again, although the hours worked on the five days are generally 48, some firms have experimented with a shorter week. The most notable example is that of a large firm of wholesale druggists and manufacturing chemists employing over 5,000 persons, who are now working a 42½-hour week. Investigation subsequently undertaken showed that they were not likely to lose to any substantial extent, and they are continuing to work five days.

Those who have themselves realized the inestimable boon of a two-day week-end as a regular thing should do all they can to help forward a movement that has clearly much to recommend it. To put it at its highest, they will, by so doing, provide for others opportunity for improved health and more recreation, while, to put it at its lowest, the adoption of the principle now may merely prove to be doing sooner what all will have to do later, inasmuch as the growing stress and strain of life may quite conceivably at no very great distance of time compel the fixing of a five-day working week.

Personal

Alderman H. T. GREENACRE, J.P., has been elected a Director of the Great Yarmouth Gas Company to take the place of the late Mr. Spencer Arnold. Mr. Greenacre, who is Chairman of the Education Committee of the County Borough of Great Yarmouth, has for many years been identified with the public life of the Borough. He is also Chairman of Directors of the Great Yarmouth Waterworks Company, and previous to its acquisition by the British Gas Light Company was for many years a Director of the Gorleston and Southtown Gas Company.

* * *

At a meeting of Kinross and Milnathort Gas Light Company, Ltd., Mr. R. S. YOUNG, who has been Secretary for over 30 years, was appointed a member of the Board in place of Mr. D. L. CHAPMAN, whose resignation has been regretfully accepted, while Mr. D. R. YOUNG was appointed Secretary of the Company in succession to his father.

* * *

Mr. THOMAS STEWART, who has been Manager at Douglas (Lanarkshire) Gas Light Company for the past 15 years, has been appointed to a similar position with Eyemouth Gas Company. Mr. Stewart's father was at one time Manager at Douglas.

Forthcoming Engagements

July.

26.—I.G.E.—Liquor Effluents and Ammonia Committee, 11 a.m.; Joint Research Committee, 2.30 p.m.

30.—I.G.E.—Joint Lighting Committee, 2.30 p.m.

August.

13.—IRISH ASSOCIATION.—Annual Meeting, Jury's Hotel, Dublin.

Sept.

9-12.—ASSOCIATION OF PUBLIC LIGHTING ENGINEERS.—Twelfth Annual Meeting and Conference in London.

12.—NORTH BRITISH ASSOCIATION.—Annual Meeting at St. Andrews.

19.—WALES AND MONMOUTHSHIRE ASSOCIATION.—Autumn Meeting at Porthcawl.

News in Brief

One of the Places Visited by Miss Edna Taylor, the Cotton Queen of Britain, when she made a tour of her native town, was the Oldham Corporation Gas showrooms.

Rhyl and Abergele.—At the Rhyl Council meeting the Clerk reported that the Board of Trade had issued an order authorizing the tranference to the Council of the Abergele Gas Undertaking.

A New Water-Cooled Condenser at Dunoon Gas-Works has recently been completed. The condenser which was installed by Messrs. Henry Balfour, Leven, Fife, deals with 750,000 cu.ft. of gas daily.

Staff's Bonus and Holiday.—Selkirk Gas Company has celebrated its centenary by giving a bonus of £1 for each completed year of service and a week's holiday with full pay to all members of the staff.

The Centenary of the establishment of the Dungannon (Co. Tyrone) Gas Company will be celebrated this month. The Company claims to be among the oldest, if not actually the oldest, gas undertaking in Ireland.

An Increase of 10·2% in the output for June over the corresponding month of 1934 was reported by the Engineer and General Manager, Mr. F. Blackburn, to the Plymouth Corporation Gas Committee on July 18.

Price Reduction for Baking.—The Skipton Urban District Council Gas Committee in response to an enquiry by a local bakery firm have reduced to 2s. 11d. per 1,000 cu.ft. the price of gas as a fuel for bakery ovens.

Second Prize in the class for Trades Exhibit on Motor Vehicle was secured by the Ossett Corporation Gas Department with an attractive arrangement of domestic appliances in the procession of the Ossett Carnival last week.

Application for a Special Order with the object *inter alia* of extending the limits within which the Company are authorized to supply gas is intended to be made to the Board of Trade by the Stroud Gas Light and Coke Company.

The Position of Sales Manager is vacant at Rochdale, and applications are invited for the post which carries a salary of £350 per annum. Further particulars will be found in the advertisement columns of this week's "JOURNAL."

A New Company has taken over the Lochmaben Gas-Works, which will however retain the former name of the Lochmaben Gas Company (1908), Ltd. The new Directors have reduced the price as from the first meter reading from 8s. 4d. to 7s. 6d. per 1,000 cu.ft.

A Rebate of 10% has been granted by Grangemouth Gas Commissioners to all consumers who have used over 50,000 cu.ft. during the past year. This concession is in addition to a reduction in the price of gas by 2½d. per 1,000 cu.ft., which became operative from May 15 last.

Applications are Invited for the position of Engineer, Manager, and Secretary to a medium-sized Gas Company. Further particulars of the post which carries a salary of from £600 to £700 per annum dependent upon experience and ability will be found in the advertisement columns of this issue.

Commercial Gas Company's Dividend.—The Directors of the Commercial Gas Company have declared an interim dividend of 2½% (less income-tax) on the ordinary stock of the Company for the half-year to June 30, 1935—payable on Aug. 15. The dividend is at the same rate as that paid for the corresponding half-year, 1934.

The Offices of Inverkeithing Gas Light Company, Ltd., after being installed for many years in premises in Church Street, are to be transferred to the Poplars district in Hope Street. There has, for some time, been a need for additional and more up-to-date accommodation, and at the new offices there will also be facilities for show windows.

Cooking will be by Gas on the buffet cars attached to a new luxury train just completed at Dundalk by the Great Northern Railway Company of Ireland. Each car will seat forty passengers, who will be served from a kitchen and pantry arranged at one end of each car. Here all the cooking will be done on a gas range using high-pressure gas stored in cylinders situated under the floor of the coach.

A Large Order for large diameter spun iron pipes to the value of over £50,000 has been received by the Stanton Ironworks Co., Ltd., near Nottingham, from the Municipality of Skoplje, Yugo-Slavia. The City Council of Skoplje when placing the order stated that although keen competitive offers were received from Continental competitors, the order was given to the Stanton Company in view of the high reputation enjoyed by Britsh material in their country.

In Our Reference to the results for the past year of the Hamilton Gas Department (p. 161 of last week's issue) it should have been stated that the sum of £3,000 had been transferred to the Common Good Account, *not* to the Revenue Account. Mr. J. B. Ferns, the Engineer and Manager, mentions that he has a block system of charging in operation, commencing at 2s. 6d. per 1,000 cu.ft., or 6·82d. per therm to all consumers—with rebates up to 50%.

Hyde Employees' Annual Outing.—The employees of the Hyde Gas Company had their annual trip on Saturday, July 13, when a large party journeyed by motor-coaches to Morecambe, dinner being taken at the Boot and Shoe Hotel, Lancaster. Later the journey was continued to Morecambe, where the party followed their own inclinations. Tea was served at the Royal Hotel, and the party returned to Hyde in the evening. Mr. H. Sidebottom was in charge of the proceedings.

One of the First Stands to catch the eye of visitors to the Warwickshire Agricultural Show, according to the *Leamington Chronicle and Warwickshire Pictorial*, was that of the Leamington Priors Gas Company. Cookery Demonstrations took place at 11 a.m., noon, and 3, 4, and 5.30 p.m. each day. These were given by Miss R. M. Thring, of Radiation, Ltd. A good selection of lighting fittings, domestic labour-saving appliances, water heaters, and a gas-operated refrigerator was exhibited. A "Wessex" gas-operated milk sterilizing outfit was of particular interest to dairymen and others who dealt with milk on a comparatively large scale. The various grades of gas coke now being produced, a modern design of coke boiler, and specimens of sulphate of ammonia and road tar were also on view. The Company also ran balloon stalls as side shows in aid of the Warneford Hospital Jubilee Fête in both the Jephson and the Pump Room Gardens.

Correspondence

Disposal of Gas Liquor—Powers of Local Authorities

SIR,—This Gas Company is a private company without either statutory authority or a Provisional Order, making gas in a small urban area. The gas liquor is discharged into the Council's sewer. Many years ago the local council's surveyor on different occasions requested the Company to discharge more of the liquor, and as much as the Company could, into the sewer so as to disinfect it. For the last 50 years and upwards without objection, until the last 3 or 4 years, it has been so discharged, and long before any request was made by the surveyor. The branch drains leading into the main sewer as well as the main sewer are, I believe, in a leaky condition. Residents in the neighbourhood of the gas-works have complained to the Council of bad smells coming from the sewer and drains. The Council indicate that they propose to insist upon the Gas Company ceasing to discharge any of the liquor into the sewers, and submit that they are not under any obligation to take or deal with any trade refuse. I should be glad to have an opinion as to:

(1) The rights of the Council to now refuse to allow the liquor to be discharged into the sewer.
(2) The best method the Company can adopt to dispose of the liquor otherwise than into the sewer. [They have no land available near the works to irrigate.]
(3) Severally, as to the whole question.

Yours, &c.,
T. HANDEL, Junr.,
Secretary.

Ilminster Gas Light, Coal, and Coke Company, Ltd.,
Gas-Works and Offices, Cross,
Ilminster,
July 22, 1935.

Amalgamation and Grouping

Severn Valley and Dawley.

The Severn Valley Gas Corporation, Ltd., announced on July 19 that their recent offer to the shareholders of Dawley Gas Company, Ltd., had been accepted by the holders of a substantial majority of the issued share capital of that Company.

The Institution of Gas Engineers

"Refresher" Course

A short course for teachers in Gas Engineering and Gas Supply was held in London from July 1 to 5, 1935, conducted by Dr. P. C. L. Thorne, H.M.I., assisted by Mr. R. W. Blount, H.M.I., and Specialist Lecturers.

There were nineteen teachers in attendance and most of the meetings were held at the Westminster Technical Institute. The Course included lectures on Methods of Teaching by Dr. Thorne, Instruction in Blackboard Drawing by Mr. S. B. Watkins, and Practical Work in Gas Supply by Dr. F. J. Eaton and Mr. E. W. B. Dunning. Among the more specialized lectures this year were one on "The Centralized Manufacture of Coal Gas" by Dr. E. W. Smith, C.B.E., "The Decorative Design of Gas Appliances" by Mr. W. S. Watts, and "The Industrial Uses of Gas" by Mr. J. E. White. Mr. C. H. Creasey, O.B.E., who organized the courses for many years, gave an interesting account of "The First Ten Years of the Gas Education Scheme." Two lectures on "The Use of the Voice in Teaching" by Mrs. Monica Thorne were an innovation in courses of this type and were much appreciated.

Visits were paid to the Fuel Research Station, East Greenwich, and to the Works of the South Metropolitan Gas Company. The kindness and hospitality of these two organizations were much appreciated.

The teachers attending the course were entertained at tea by The Institution of Gas Engineers and took part in the meeting of the Gas Education Consultative Committee of the Institution.

Among the visitors to the course were Mr. John Terrace, M.Inst.C.E., M.Inst.Gas E., Vice-Chairman of the Gas Education Committee, Mr. S. B. Chandler, A.M.I.Mech.E., M.Inst.Gas E. (Tottenham), Examiner and Assessor in Gas Supply, and Mr. J. Alsop, Honorary Secretary of the Lancashire District Gas Education Committee. Both teachers and visitors expressed their appreciation of the value of the course and it is hoped that in future years both Educational Institutions and Gas Undertakings will support the course to the utmost of their ability.

The giant chef of Radiation Ltd. is a familiar figure in carnivals throughout the land. Whether there is special merit in Wandsworth gas, or whether the air of their Sutton area, where he last appeared, is specially salubrious, we are not prepared to say, but, whatever the reason, he appears more monstrous than ever in our picture.

Cumberland and Westmorland Gas Managers' Association

At a meeting of the Cumberland and Westmorland Gas Managers' Association held under the Presidency of Mr. J. Denham (Whitehaven) at Workington on June 27, the following officials were elected for the year 1935-36:

President.—Mr. C. T. Hague (Ulverston).
Vice-President.—Mr. A. L. Robertson (Wigton).

Mr. F. G. Bowness (Maryport) was re-elected Hon. Secretary.

Electricity Failures in the House

The Minister of Transport has appointed a Committee to review the situation in regard to the distribution of electricity, and to make recommendations. On the day he announced this in the House of Commons, there was a failure of electricity supply which held up a debate on foreign policy for 23 minutes.

Subsequently Mr. W. R. D. Perkins, M.P. for Stroud, asked Mr. Ormesby Gore, First Commissioner of Works, what he was going to do about the repeated failures of electric light. In reply Mr. Ormesby Gore stated that he was, of course, much concerned that the business of the House should be interrupted owing to failure in the lighting arrangement, but, "until I am convinced that the risk of failure is likely to increase, I do not consider that I should be justified in incurring the heavy expense either of substituting gas for electric lighting in the Chamber itself or of providing an emergency supply either of gas or electricity."

Which is not a very satisfactory reply.

Architects and Gas

The architectural profession was well represented at the Holborn Restaurant on Wednesday last. The occasion was a reception by Dr. Bernard Friedman, Managing Director of Ascot Gas Water Heaters, Ltd. It was yet another example of Dr. Friedman's splendid efforts on behalf of the Gas Industry to keep in contact with architects with the object of impressing upon them the strong case for the universal use of gas for domestic purposes, particularly water heating. Many expressions of admiration were heard on the subject of Dr. Friedman's remarkable book "Gas—The National Fuel: Its Use for Domestic Water Heaters," which was reviewed in our columns recently.

Education and Examinations

Statistical Schedule and Arrangements for 1936

Examinees.—The Comparative Statistical Schedule of the 1934 and 1935 Examination Results indicates that the number of examinees is being maintained. It is interesting to observe that, when the published figures are increased by adding the number of candidates who sat for the examinations, but whose results are not included for the reasons given in the prefatory note to the published results, the number in 1934 was 497 and in 1935 it was 513.

Qualifications for Membership of the Institution.—Possession of the Diploma in Gas Engineering (Manufacture) or of the Diploma in Gas Engineering (Supply) is one of the qualifications necessary for admission to the Institution as a member, while the Higher Grade Certificate in Gas Engineering is required, *inter alia*, for election as an associate member and the Higher Grade Certificate in Gas Supply is required for admission to associateship. The Ordinary Grade Certificate in Gas Engineering and Gas Supply is required for admission to studentship of the Institution.

Publications.—Copies of the Royal Charter and By-Laws, Forms of Application for Admission to the Institution, the 1935 Examination question papers and the 1934 Revision of the Education Regulations of the Institution can be obtained from the Secretary, The Institution of Gas Engineers, 28, Grosvenor Gardens, London, S.W. 1.

Dates of Examinations, 1936.—The next examinations in Gas Engineering will be held on April 25, 1936, and in Gas

Supply on May 2, 1936. Applications to sit for either of these examinations should be received by the Secretary not later than Feb. 28, 1936. The Education Calendar for 1936 will be available in December next.

Charles Hunt Memorial Medals.—The Charles Hunt Memorial Medals, generously endowed in 1930 by Mr. P. C. Holmes Hunt, on behalf of himself and his brothers and sisters, in memory of their father, are awarded, generally annually, to the candidates who achieve the highest standards in the examinations for the Diplomas in Gas Engineering (Manufacture) and in Gas Engineering (Supply), provided such standard satisfies the Council, on the recommendation of the Gas Education Committee and the Board of Examiners. The medals are not awarded on the 1935 Examinations.

Permission to Sit for Examination.—Permission to Sit for an Examination is given only in respect of the Examination to be held next after such permission is granted. Students have to comply with the Regulations in force at the time of the Examination.

Entries for Ancillary Subject Examinations.—Notification of a candidate's intention to present himself for examination in a subject ancillary to Gas Engineering or Gas Supply must be received by the Secretary of the Institution not later than Jan. 15 in each year. External students have to satisfy themselves that they are working to the syllabus of the examining authority in whose area they reside and by whom they would normally be examined. Copies of such syllabuses can be obtained from the examining authority. Candidates are responsible for entering themselves for the examinations on receipt of instructions from the Institution to that effect, these being issued after the Secretary has received notification of the candidate's intention to present himself for examination in certain subjects.

Publication of Theses.—The copyright and property in all theses is vested in the Institution. A Student desiring to publish his thesis, or to present it at any Meeting, must apply to the Secretary of the Institution for permission. If given, such permission is subject to the thesis being presented as a Paper in the ordinary way and not being associated with the Diploma examination.

The Gas Industry and the "Special Areas"

By EILEEN MURPHY

The first Report of the Commissioner for the Special Areas (Durham, West Cumberland, and South Wales) has just been published. From more than one point of view it merits the close attention of every gas man. In the first place the Report, in addition to the fact that it is far more vividly written than most blue books, turns the limelight on a problem which for several years has been the study, and almost the despair, of the most active and responsible people in the community—the problem of alleviating conditions in those areas which have been hardest hit by industrial depression, where the proportion of unemployed represents 35% or thereabouts of the insured population, and where more than 50% of the unemployed have been out of work for at least a year.

All the Special Areas, as the Commissioner points out, have a common feature. "Nature has bountifully endowed them with coal located within easy access of the sea." The growth of economic nationalism in other countries has led to the decay of the export market for coal. The industrial débacle of the areas, says the Report, has been accelerated by the competition of foreign oil and the improved efficiency of electrical generation. "The opportunity of using coal for transport has been much curtailed through the competition of imported oil. Its practical use, to the convenience of mankind, has rapidly been extended by the invention of engines making possible cheap transport from door to door and the providing of cheap power in small self-contained units. The concentration of the generation of electrical power in large stations and the much improved efficiency in the raising of steam have not only decreased the volume of demand, but brought about a change in the class and size of the coal called for."

The Report proceeds to comment adversely on the working of the Coal Mines Act (1930) and remarks that standard selling prices are not observed, evasion being procured by resort to devious devices. Yet when a policy favouring more efficient production is embarked upon, and the present system of quotas discontinued, there cannot fail to be an increase of unemployment among miners. The present system, in the words of the Commissioner, "bolsters up inefficiency." What is the future for the Coal Industry? "I venture to forecast that the present outlook is not bright. The future, however, is not without hope. We possess vast resources of coal; this capital asset remains, although its value to-day is reduced because turnover and margin of profit have shrunk. A demand on the old scale for raw coal may be unlikely, but if we can but hasten the advance of knowledge of how to treat coal at the pithead, stimulate research and the application of scientific methods whereby its latent products can be economically extracted, we shall assuredly bring about a change in prospects which will herald a new demand to replace lost trade."

The Gas Industry's Part.

These last words which have been quoted far and wide in the Press have a particular significance for the Gas Industry. At this moment everyone who takes an intelligent interest in current economic problems is forced to concentrate attention on the problem of coal. We should ask ourselves how far the average citizen is able to base his judgment of the situation on accurate information as to existing methods of treating coal. How many people know that the Gas Industry is already applying "scientific methods for extracting economically the latent products of coal?" Those are the words of the Commissioner; but it is doubtful whether many of his readers associated the Gas Industry with them. Surely the time has come for all of us to increase our efforts to make known the national aspect of the Gas Industry; to show its position as the most economical method of extracting every valuable element of coal, including benzole; and to demonstrate the vital importance of a well-managed Gas Industry as a stimulant to the efficiency and prosperity of other national industries. How many people, for instance, have been taught to recognize the connection between the revival of the steel industry and the fact that 60% of the gas output at Sheffield is sold for industrial purposes? How many people realize that town gas is the chief barrier to the use of imported oil in industry, and that every new gas installation in an industrial works is thus a positive gain to the coal industry? These are facts which should be plainly stated by all of us. The era of political interference in industry is still young, and we owe it to ourselves to influence public opinion in our favour by a straightforward explanation of the Industry's national importance.

Cookery Courses—by Gas.

There is another section of the Report which demands the attention of the Gas Industry. I quote the Commissioner once more:

"I have had under consideration the question of nutrition in the Special Areas, and I feel that there is room for improvement in regard to the methods of purchase and preparation of food in working-class homes. There is a real need for direction and instruction. . . . My object is to enable the women-folk to learn which foodstuffs have the best nutritive value, to spread such money as is available to them economically and wisely on essential foodstuffs, and to teach them how to prepare these most suitably and palatably for family consumption. For this purpose I think that no more practicable service can be instituted than by providing courses in simple cookery for housewives."

I could mention off-hand many gas undertakings which already perform this essential social service. I have in mind particularly a gas company, in the heart of one of the Special Areas, which has earned the warm commendation of the Medical Officer of Health for the public-spirited way in which it has organized courses in economical cookery for the poorer housewives in the district. Such work as this brings in no high dividends; but it shows well enough the high sense of responsibility which actuates the gas company, and it constitutes a genuine contribution towards the alleviation of a pressing national problem.

200
W-D WASTE HEAT BOILERS

INSTALLED OR
BEING INSTALLED
IN CONJUNCTION WITH

HORIZONTAL
AND CONTINUOUS
& INTERMITTENT
VERTICAL
RETORT SETTINGS

W-D

In 1917 Woodall-Duckham pioneered the use of waste heat boilers with **Continuous Vertical Retorts**

In 1918 the Woodall-Duckham Horizontal Firetube Waste Heat Boiler was designed

In 1922 Woodall-Duckham successfully applied waste heat boilers to **Small Retort Plants**

In 1924 Woodall-Duckham installed the first W-D Waste Heat Boiler to work in conjunction with **Horizontal Retorts**

In 1925 Woodall-Duckham installed the first W-D Waste Heat Boiler to work in conjunction with **Intermittent Vertical Chamber** Settings

In 1927 Woodall-Duckham pioneered the commercial application of the principle of **"Augmentation of Waste Gases,"** whereby, so as to supplement the supply of waste gases, producer gas is diverted through a supplementary combustion flue for admixture with the waste gases on their way from the settings to the boiler

In 1928 Woodall-Duckham designed the W-D **Natural Draught** Horizontal Firetube Waste Heat Boiler specially for use with Small Retort Installations

In 1935 the **200th** W-D Waste Heat Boiler has been ordered and this is the **24th** to which the principle of "augmentation by producer gas" has been applied

THE WOODALL-DUCKHAM VERTICAL RETORT AND OVEN CONSTRUCTION CO. (1920) LTD., EBURY & ALLINGTON HOUSES, 136-150 VICTORIA STREET, LONDON, S.W.1
Members of the Society of British Gas Industries
Telegrams: "Retortical, Sowest, London" Telephone: Victoria 8631 (6 lines)

This pre-cast Lead Ring

cuts out run lead and caulking

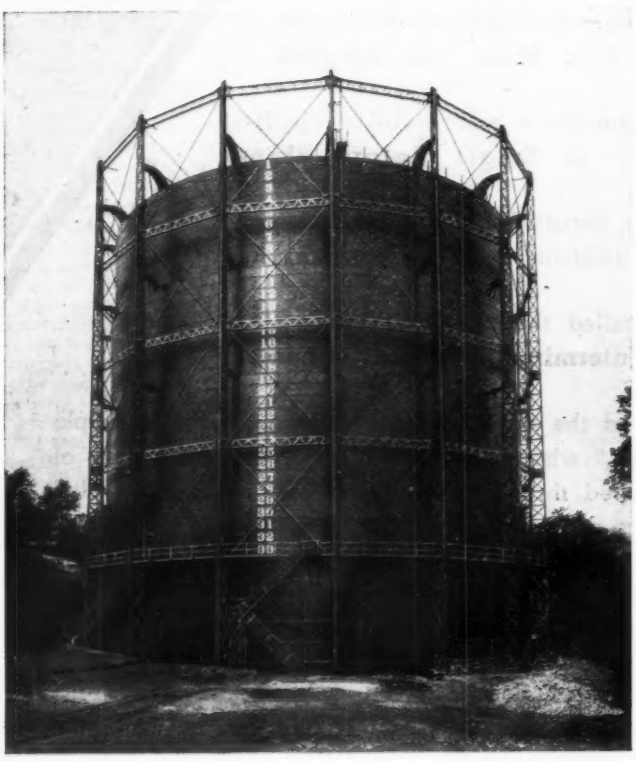
Using a spanner as his only tool, an unskilled workman can make the Stanton Mechanical Lead Joint in a fraction of the time which it takes a skilled hand to run lead into and caulk an open socket joint. A pre-cast lead ring is slipped over the spigot, two half-collars are placed in position, and the jointing operation is completed by the tightening of four cast-iron set-screws.

Inside the lead ring is cast a corrugated steel spring insertion ring, which uniformly distributes the end pressure so that the joint is effective throughout its full depth—and not for a portion only as in a caulked joint. The ring is mechanically held in position and cannot be dislodged by "drawing" of the spigot.

PATENT No. 404955
OTHER PATENTS PENDING

STANTON MECHANICAL LEAD JOINT

THE STANTON IRONWORKS COMPANY LIMITED, Nr. NOTTINGHAM



AT TORQUAY. CAPACITY 1½ MILLION CUBIC FEET.

C. & W. WALKER
LIMITED

DONNINGTON, Nr. WELLINGTON—SHROPSHIRE

GASHOLDERS

GUIDE FRAMED
AND
SPIRAL GUIDED
WITH OR WITHOUT
STEEL TANKS

WATERLESS
AND
HIGH PRESSURE
HOLDERS

MATERIALS—BRITISH.
CONSTRUCTION—IN OUR OWN WORKSHOPS.
ERECTION—BY SPECIALISTS.

LONDON OFFICE—70, VICTORIA STREET, WESTMINSTER, S.W.1.

The Great Gas Refrigerator Campaign

One of the most energetic and successful sales campaigns probably ever organized in this country is that of the Gas Light and Coke Company which, at any rate so far as London is concerned, has definitely put gas refrigerators "on the map."

Even the most unobservant of newspaper readers cannot have failed to have noticed that there has been during recent weeks some talk about gas refrigerators in the advertising columns of most of our national Dailies. That it formed part of what is probably one of the most concentrated sales campaigns ever organized in the Gas Industry is not, perhaps, so generally known. But the undisputed result of having made a large section of the public definitely "refrigerator-minded" should be the cause of considerable gratification to all in the Industry. For the campaign has had its effect far beyond the confines of the Company which instigated it.

The Gas Light and Coke Company had for some time shared the view of many others in the Industry that there was a vast potential market for gas refrigerators if only some suitable sales and marketing scheme could be evolved. So they set themselves the task of producing such a scheme—and about two months ago the campaign was launched with all the energy and enthusiasm the Company's sales organization could muster. Up to that time it should be noted that the Company had installed less than 600 refrigerators throughout their extensive area.

A Figure to Attract.

The scheme—which throughout the whole of its publicity campaign has been referred to as "The Greatest Refrigerator Offer Ever Made"—has been essentially with the object of putting a relatively expensive piece of apparatus within the reach of the vast majority of consumers. Therefore the figure of half-a-crown a week (or less for the smallest model) was chosen as one which was likely to make a popular appeal. With each model the Company give a five-years' guarantee, with free installation and maintenance. Furthermore, an effort has been made to impress upon the public that refrigeration in the home is rather a necessity than a luxury.

In connection with the campaign the Company issued to 400,000 of its ordinary consumers an attractively illustrated booklet in which it was emphasized that no modern home is complete without a gas refrigerator. The convenience and advantages that the refrigerator brings to the home in addition to its value in the preservation of health are convincingly presented to the reader of this publication. Three models are briefly described—viz., the Freezolux LDA, LDB, and LJK, particular reference being made to shelf area, ice-making capacity, external finish, and overall dimensions. The cash price for any particular model and the correspondingly easy terms which are paid quarterly and spread over five years are also stated. If the consumer should require any further particulars the Gas Light and Coke Company will send a representative on request to tell her all about the Freezolux gas refrigerator without putting her under any obligation.

The personal convenience of the prospective purchaser of a refrigerator was a primary consideration in the publication of the booklet even to the provision of the folio number of the Telephone Directory where the telephone numbers and addresses of the Company's showrooms are to be found.

The Great "Push."

Armed with this preliminary ammunition, therefore, the great "push" was launched at the beginning of May and continued until a fortnight ago. The familiar advertisements appeared regularly in most of the leading London Dailies and suburban newspapers, so that scarcely a day passed without at least one such announcement appearing in one or other of the papers. At the same time posters appeared on all the Company's premises as well as on the Underground Railways and other prominent positions; special refrigerator displays and demonstrations were featured in every one of the Company's many showrooms, while a large number of likely consumers were personally approached. Concurrently, the dealers with whom the Company recently introduced their system of sales co-operation entered wholeheartedly into the campaign.

Mere figures by way of illustrating results of selling campaigns are apt at times to make dull reading. But so phenomenal was the response in this particular instance that a record of the number of gas refrigerators put out must be stated in order to give a true representation of what can be achieved. During the nine weeks that the publicity campaign was in active operation the Company have put out not far short of 7,000 refrigerators, while the maximum number of orders booked on a single day reached the astonishing total of nearly 400. The demand still continues, and it is hardly necessary to say that the Electrolux factory at Luton is working at full capacity in an effort to keep pace with the orders.

It is also interesting to note that the cheapest model (the LDA) is not the best seller, but that the LDB (or 2 cu.ft. size) makes the most ready appeal—and this is by no means an inexpensive apparatus, which shows what can be achieved by energetic publicity methods combined with an attractive selling scheme.

The Coupon System.

Attached to each advertisement was a coupon upon the presentation of which the purchaser was allowed 10s. 6d. off the first quarter's payment. Strange to say, however, only a comparatively small percentage of the total number of purchasers availed themselves of this offer—which seems to show that they had been definitely convinced of their need for a refrigerator, regardless of what one may, perhaps, without offence describe as the small "bribe" attached to the advertisement.

Moreover, this advertising not only led to hire-purchase installations, but also caught the eye of many of the more well-to-do consumers for the first time and brought them to the realization that a refrigerator would be an advantage in their homes—with the result that there have been quite an appreciable number of "cash-down" purchasers.

It need hardly be mentioned, in addition, that the campaign has done much to shake people out of the idea that gas is old-fashioned. A fuel which can efficiently perform what is still regarded in this country as one of the most up-to-date of functions—namely, refrigeration—cannot be in such a state of senile decay as many would have us believe.

A considerable number of enquiries have also been received from slot consumers, and many refrigerators installed upon terms which include a proportion of the quarterly payments being collected *via* the meter.

For those who consider that the refrigerator load is only obtainable during the height of the all too short English summer, it is a significant fact that a large number of orders were received by the Company during the regrettable weather conditions which characterized almost the whole of last May.

Far-Reaching Results.

As we have said, the repercussions of the Gas Light and Coke Company's great refrigerator campaign have been felt far beyond the confines of their own area of supply, which has, needless to say, brought in a large number of enquiries from people resident in other undertakings' areas. Indeed, we understand that one enquiry for forty machines was received from the Gold Coast where neither gas nor electricity is yet available!

Enquiries from those living in other districts, however, are turned over at once to the B.C.G.A., who get in touch with the undertaking concerned. And this brings us naturally to the problem of other undertakings falling into line for the general good of the Industry in connection with this refrigerator business. It is a difficult problem and one which cannot be discussed here. It is, however, not impossible of solution, and it will doubtless have to be tackled seriously in the not too distant future.

Meanwhile, there is in the remarkable results of the Gas Light and Coke Company's scheme a record of achievement of which they may justly feel proud and in which all in

the Industry have cause for gratification. It has proved the existence of a potential but hitherto untapped market which will yield a valuable load—and, most important, *a summertime load*, though naturally consumers are encouraged to use their machines all the year round. In short, it has definitely put gas refrigeration "on the map." Maybe history has been made, and the Gas Industry of the future—when refrigeration will be a matter of course in every household—will refer to "the great refrigerator campaign of 1935."

International Commission on Illumination

Ninth Plenary Meeting in Berlin and Karlsruhe

The Ninth Session of the International Commission on Illumination was opened in the Reichstag building in Berlin on July 2, with the President, Dr. A. MEYER, in the chair.

Dr. Lippert, State Commissioner for the City of Berlin, on behalf of the German Government welcomed the delegates (representing some eighteen countries).

The delegates from the British Gas Industry were Colonel W. M. Carr, O.B.E. (President of The Institution of Gas Engineers), Messrs. J. R. W. Alexander (Secretary of the Institution), W. J. A. Butterfield (who led the delegation), J. G. Clark (B.C.G.A.), W. J. G. Davey (W. Parkinson & Co.), A. C. Higgins (South Metropolitan Gas Company), A. R. McGibbon (Wm. Sugg & Co., Ltd.), C. A. Masterman (Gas Light and Coke Company), F. C. Smith (Gas Light and Coke Company, Deputy Leader and Secretary of the delegation), and P. Crawford Sugg (Wm. Sugg & Co., Ltd.).

It was announced that Spain had sent a strong delegation in support of an application from that country for membership of the Commission, which application had been unanimously accepted. Similar applications from Roumania and Russia were under consideration.

In his opening remarks the President, describing the growth of the knowledge of lighting, pointed to the enlarged field of endeavour of the Commission, due to the passing of its activities from the mere technique of illumination to the practical and economic aspects of the lighting art.

Description of the proceedings would be very incomplete without a testimony to the arrangements made by the German National Committee for the meetings. In Berlin the Reichstag was placed at disposal and the work was carried on in great comfort and with a dignity suited to a serious effort. In Karlsruhe, famous as an educational centre, the new buildings of the Technical University were made available and the original spherical photometer designed by Ulbrecht at Dresden was placed in the entrance hall as an object of interest. In all the plans for work and recreation the German Committee showed a fine appreciation of their visitors by touching with simple naturalness on every occasion an artistic note.

At the conclusion of the meetings Professor Charles Fabry was invited to be the next President, and it was agreed to hold the 10th Session in Holland in 1938.

General.

Great Britain has been nominated as the Secretariat Committee for Street Lighting and Glare. The value of the work of the British Committee on Street Lighting and the work of the National Physical Laboratory on Glare are recognized by this nomination.

The importance of the work of the various Secretariats is not perhaps fully recognized except by those attending the meetings. It will be clear that meetings held in three languages once every three years for what can only be comparatively a few hours, could not, in general, accomplish sufficient to justify these attendances, unless the subjects for discussion had been fully prepared during the triennial period. It is on this, the Secretariats' work, that progress largely depends, and this in turn must depend on the co-operation of each National Committee and the effort which it makes.

The Secretariat Report becomes, with effective co-operation, a report on the work accomplished all over the world during the previous 3 years; the meeting provides the occasion for a clarification of any of the points dealt with, for a direct exchange of experiences and views between the leading experts, and, finally, as a result of the study of the Secretariat Reports and these discussions the Commission, by its resolutions and recommendations to National Committees, not only sets the seal of international decision on the agreed results of the Secretariat Reports, but also sets a programme of future work which by such directing influence leads to results being secured in the directions desired without in any way preventing the development of independent work in each country.

The value of the work of the C.I.E. must be measured (*a*) in terms of its Secretariat Reports, and the recorded decisions of the Commission thereon; (*b*) in terms of the advantages of meetings between scientific workers in each country and the opportunity of seeing directly each other's work; and (*c*) finally, and, perhaps to the community the most important, in terms of the progress of the science of lighting.

That this latter has been accelerated after each of the recent triennial meetings is unquestionable; and all observers are agreed that this is so.

This importance of the Secretariat work was emphasized very strongly, and at the Plenary Meeting a number of proposals were made towards improvements in their organ-

Belgian Gas Engineers with Messrs. J. G. Clark, A. G. Higgins, F. C. Smith, and P. Crawford Sugg outside the Gas Pavilion at the Brussels Exhibition.

ization to this end. It was agreed to authorize the Central Office to print and issue the conclusions reached at all the previous meetings so that they will be available in handy form.

In conclusion, the work of the President, Dr. Meyer, the Hon. Treasurer, M. Filliol, and the Hon. Secretary, Mr. C. C. Paterson, and the Central Bureau under the charge of Mr. Preston, of the N.P.L., was highly commended on all sides.

Factory and School Lighting.

The Secretariat Report summarized the lighting investigations in factories and schools, special attention being drawn to the waste of time and public money resulting from bad lighting in schools. It had been shown in U.S.A. that good lighting materially assisted scholars in acquiring knowledge. The conservation of eyesight resulting from better lighting should also be better known.

The Commission adopted the following minimum values of illumination in schools and recommend that these values

be exceeded in the interest of human efficiency, comfort, and eyesight preservation.

—	Minimum Foot Candles.
A—Sewing room, drafting rooms, art rooms, and rooms where fine detailed work is to be done—on the work itself	10
B—Class rooms—on desks and blackboards; study rooms and libraries—on desks and tables; workshops and vocational training centres, laboratories—on the work	8
C—Gymnasia, &c., school halls, &c.	3
D—Corrridors, stairs, &c.	2

The above values are higher than the present recommendations of the Illuminating Engineering Society.

The Commission also recommend investigations on a scientific basis for lighting codes and research on the economic aspects of lighting as seen by increases in the quantity and quality of output in factories.

Lighting Practice.

The Secretariat presented a report that was, in effect, a continuation of the series of Papers presented at the last three Plenary Meetings. The report consisted of two parts. The first was a brief summary of propaganda in favour of lighting, with short additional sections dealing with the characteristics of the movement in the various countries. The second part consisted of a review of the trends in applied lighting during the past few years and descriptions of the new construction of lamps and new light sources.

It was agreed to continue this series of reports and to include gas lighting, to widen the scope of the general review, and to study a series of special lighting subjects.

In connection with street lighting there was general agreement on the necessity for further study of background brightness in relation to visibility and the best means of producing it.

The British Committee will submit proposals as to the location on the road at which measurement should always be taken to enable international comparison of results to be readily made, although it was agreed that many other measurements might be necessary for a complete study of the subject. It was agreed that in the initial stages of the study the eye of the observer should be at 5 ft. above the road surface.

The attention of the Authorities will be directed to the developments since 1931 in the production of light and in its more effective utilization for street lighting purposes.

Glare.

Reviewing recent work on glare the Committee considered among other points the effects produced by dazzling lights on the visibility of objects not within the direct field of view. A classification was put forward of all the different effects embraced in the terms " dazzle " and " glare," but it was agreed to exclude effects arising from non-visible rays in the infra-red and ultra violet. Among the questions laid down for future study was the determination of certain standard conditions of vision in lighted streets with respect to size and position of object, direction and time of vision, &c. With agreed standard conditions the results of investigations in different countries are likely to lead to concordant conclusions on the part played by glare in street lighting, &c., and how the undesirable effects may be eliminated.

The need for a system of definitions of a fundamental character was accepted, and Herr Jobeck, M. Fleury, and Mr. T. Smith were invited to correspond with a view to putting a proposal for such a system before the National Committees at an early date in order to secure the adoption of an agreed system at the next plenary meeting in 1938.

The Plenary Meeting approved the issue of the International Vocabulary of Illumination Terms and Definitions in three languages, French, English, and German, and has agreed that the Italian and Spanish Committees may provide translations of the terms, but not the definitions, for inclusion therein.

Photometry.

The general question of photometric procedure is now being studied under two heads—(*a*) Visual, (*b*) Physical. In regard to test plates the report presented by the Polish Secretariat proved to be a remarkable piece of work. It represents a complete review of the effects of the errors produced by altering the angles of incidence and of viewing. Considerable discussion took place on the methods of reducing such errors by compensated plates, and more experimental work will be carried out on the subject.

The Commission will recommend to the National Committees that colours be expressed on the hue and saturation basis, the centroid of the colour triangle (C.I.E., 1931) being taken as the reference point unless otherwise stated. The National Committees have agreed to study the standardization of the conditions under which colour measurements on glossy materials may be made, bearing in mind the German proposals.

The National Committees are also to study the effect of the state of adaptation of the eye on colorimetric measurements.

The Domestic Coke Market and the Gas Industry

by
JOHN ROBERTS,
D.I.C.

The outsider who is almost a disinterested observer may frequently offer suggestions which demand serious consideration by those in the Industry itself, and a fresh viewpoint or line of approach is often as valuable in commercial and industrial work as in research.

The Gas Industry has in the last year or two received no little attention from prominent members of other industries, particularly those closely associated with fuel utilization.

The present writer is not altogether detached, since he has devoted a good deal of attention to one or two matters of direct interest to the Gas Industry. It is not only gas manufacturers and distributors who are able to see the trend of development in building, housing, the heating of buildings, and the changing demands of the public. Such questions as the diminution in the lighting load, for example, are obvious to most observers who face facts. The abolition of slum dwellings that formerly used gas for lighting, and their replacement by modern houses, flats, and tenements wired for electric lighting will eventually mean a continuous reduction in the lighting load, and competition from electricity undertakings will make it increasingly difficult to maintain gas for street illumination.

Nor can we ignore the inroads which electricity is making in regard to the cooking load, in spite of the higher cost as compared with gas. It is clear, therefore, that it behoves the Gas Industry to put forth its best effort to maintain the heating and cooking loads, and if possible to expand in both directions.

Suggested Line of Attack.

There are many suggestions which could be put forward to indicate how the Industry could extend its service, to the mutual advantage of the community and itself, but in this article I will confine myself to one aspect only—namely, the domestic heating side of the business—a branch which has received far too little attention in the past, but one in which the prospects of appreciable advances are attractive. To put the matter briefly, the Gas Industry must advance on the domestic solid fuel front. This must not be taken to mean an attack on the coal distribution trade, but the replacement of coal by solid smokeless fuel; this fuel would still have to be retailed and distributed in as great a quantity as is raw coal at present.

No Gas Engineer will question the desirability of smoke abatement, the wastefulness of smoky coal consumption, or the enhanced radiant efficiency of smokeless fuels. We must acknowledge the advantages of the open fire under British climatic conditions, and admit that from the point

of view of cost the open fire is cheaper than the gas fire, while the electric fire is still more expensive. In view of the fact that comparatively little gas-works coke is used in open grates, it must also be allowed that the Gas Industry is doing far too little towards producing that smokeless fuel which provides the most desirable and cheapest form of domestic heating. To neglect this market is an oversight of great magnitude. The Industry will not fulfil its function until it caters for the complete requirements of the householder in this respect.

The large gas undertakings of this country are most favourably situated for the development of the smokeless fuel industry, and are frequently in a better position than the collieries themselves. The chief gas-works are within easy reach by rail, canal, or sea of the coalfields, and can therefore draw upon just what coals they require, whereas a colliery is restricted to the classes of coal mined thereat. Gas undertakings are located " on top of the market," and can utilize or distribute the whole of the products of the process, while a colliery concern may be handicapped for the want of a market for surplus gas. There is thus considerable scope for the adoption of flexible processes, which can be balanced to produce high yields or low yields of gas, solid fuels, and of liquid products. In the past, it has probably been the correct policy to endeavour to obtain the maximum yield of gas per ton of coal, and if the solid fuel side of the business were less attractive than it is, that policy might be continued; but the indications are that a change of policy is demanded, " killing two birds with one stone," by maintaining the demands for gas while at the same time providing the consumer with the solid fuel he requires.

The Gas Industry should be the universal provider, if not purveyor, of smokeless fuel, and if it will set itself out to produce a free-burning coke suitable for use in open grates, much can be accomplished towards that end.

Gas-Free Coke.

If we view a gas retort as a carbonizing machine—which is the correct view to take—it may reasonably be urged by Gas Engineers that the machine must be worked at its maximum efficiency, and it should be the object to obtain the maximum yield of therms in the state demanded by the economics of that industry—namely, the gaseous state. In my view, however, the Gas Engineer who does not look beyond the gasholder " places his head in the sand." It is not so much a question of the existing market, but the market which could be created by engineers of vision, who were prepared to adapt their processes to meet the requirements of consumers who are uncatered for at present. The Gas Industry in this country carbonizes about one-half as much coal as domestic consumers use in the raw state, and makes less than one-quarter as much solid gas-free smokeless fuel. This gas-free coke calls for special appliances to enable it to replace raw coal in the domestic grate, and although the use of these appliances is expanding, progress in smoke abatement will be very slow indeed if we rely solely on such measures.

One occasionally meets an enthusiastic coke salesman who claims that the so-called " gas coke " (a better term is " gas-free coke ") adequately meets the needs of domestic consumers, while other more cautious engineers realize and admit that it does not fill the bill by any means, and the fact remains that the revenue obtained from coke sales (works price) does not cover the cost of the coal carbonized. There is obviously something wrong here, because it is possible to produce 14 cwt. of smokeless fuel from one ton of coal, which smokeless fuel is of equal, if not greater, value to the consumer than the ton of raw coal, and the works price of the manufactured fuel should therefore be, and is, greater than that of the raw material. In this case, however, the smokeless fuel is not a gas-free coke, but one containing 4% or upwards of combustible gas.

The Consumer's Attitude.

The next question that arises is whether there is a market for such fuel, and whether it could be expanded sufficiently to justify a change of policy on the part of the carbonizing industry.

The answer to the first part of the question is that the existing plants manufacturing smokeless open-grate coke are unable to meet the demand, and in view of the fact that consumers are prepared to pay prices rather higher than ruling prices for " best coal," it is clear that the right type of coke would find a ready market. Those consumers who buy the best household coal generally demand coal of low ash content, and having good free-burning and heat-giving properties. Too few of them have as yet worried about the smoke-yielding and soot-forming properties, as they consider smoke and soot inevitable in a domestic fuel. Consequently, these consumers rarely specify that the fuel shall be low in volatile content.

On the other hand, when once they have given a trial to a good smokeless fuel their disappointment is loudly expressed when supplies become unobtainable, and it appears that they will tolerate rather more ash in smokeless fuel than they will in coal. Ash dust is less objectionable than soot and smoke, and any nuisance that may arise from ash is confined within the limits of the one room in which the fire burns, whereas smoke contaminates the atmosphere, and returns to every room in the household.

Between the extremes of raw, smoky coal and gas-free coke there is a wide, but shallow, gulf, easily fordable. The two main stepping-stones are low-temperature and medium-temperature carbonization. The extremist on the one side views low-temperature with alarm, because the yield of surplus gas is negligible. There may be some justification for that, unless the system can be demonstrated to be economic; but if it can be shown that an economic balance can be obtained, it should obviously be to the interest of existing carbonizing industries to expand in all directions.

There is still a shorter step which can be taken by the Gas Industry—namely, the adoption of one or other of the medium-temperature processes, in which yields of gas ranging from 6,000 to 9,000 cu.ft. per ton can be obtained, at the same time producing a smokeless fuel having 4 to 8% of volatile. This means that for a given daily make of gas an increased tonnage of coal must be treated, which is contrary to the trend of development in recent years, where the object has been to extract the utmost gas from the coal, and also to gasify part of the carbon by steaming the hot coke before discharge. The real advocate of smoke abatement will not be averse to a modification of policy, as his object is to bridge the gulf above mentioned, and to see an increase in the consumption of smokeless fuels, solid and gaseous, with a corresponding decrease in the use of raw coal for domestic purposes.

Four Carbonizing Systems.

It is the domestic coal market which offers the greatest scope in this industry, and it is quite unnecessary to limit the expansion of gas sales. A modern gas-making plant could, in fact, employ four systems of carbonizing—namely, (1) high-temperature carbonization coupled with steaming for the production of cheap gas and cheap gas-free coke for coke boilers; (2) medium-temperature carbonization (fast coking) for the cheap production of free-burning open-grate coke of 4% volatile content, and a moderate yield of gas; (3) medium-temperature carbonization (slow coking), producing a smokeless fuel with about 7% of volatile matter, and a smaller yield of surplus gas; (4) low-temperature carbonization for the production of free-burning semi-coke, with the maximum tar yield, and a minimum gas yield.

In the latter case the use of metal retorts will be preferred, and these may be of the tubular pattern, rectangular, or cylindrical. Considerable experience has been obtained in recent years with retorts of these three types, and very good smokeless fuel can be produced in each. The limit of flue temperatures in these cases will be about 600° C. Rather higher temperatures can be used when employing brick retorts at medium temperatures (up to 850° C.), with a carbonizing temperature in the region of 700° C. The latter retorts could, of course, be worked at higher temperatures, if required, but on a much shorter coking schedule, with a correspondingly higher throughput, as in system No. 2 above. In this respect the medium-temperature process would be sufficiently flexible to meet fluctuations in the demand for gas.

Blending End Products.

The foregoing is what the writer considers ought to be the policy of enterprising manufacturers of gas and solid smokeless fuel; and as several coke oven batteries supply large quantities of town gas, it is unnecessary to draw too fine a distinction between the coking and the gas industries. It will be obvious that at least four types of solid fuel would be manufactured at such a plant, and the timorous manager may be somewhat apprehensive as to the marketing of these products. For my own part I consider it should be equally as easy to market the different grades as it is for a colliery company to-day to market, say, six classes of coal, together with foundry coke, furnace coke, and three or four grades of domestic coke. The fuels could be classified, graded, and blended so as to suit every type of domestic heating appliance. It is equally as important to blend end products as it is to blend raw coals in the process of manufacture.

An industry cannot remain stationary; it must either advance or recede. If the gas market has become saturated, the line of advance should be in the direction of carbonizing more coal, with a lower yield of gas per ton. Even with a revolutionary change in carbonizing practice it would take 15 to 20 years to saturate the domestic solid fuel market.

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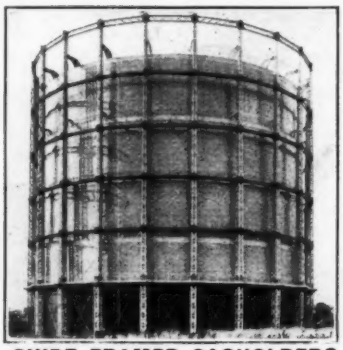

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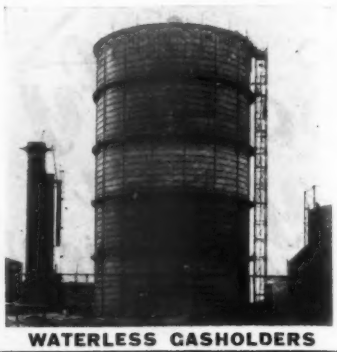

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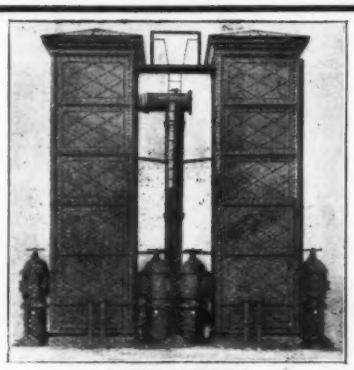

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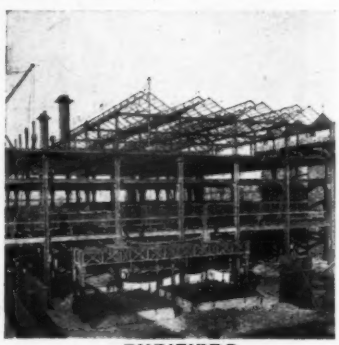

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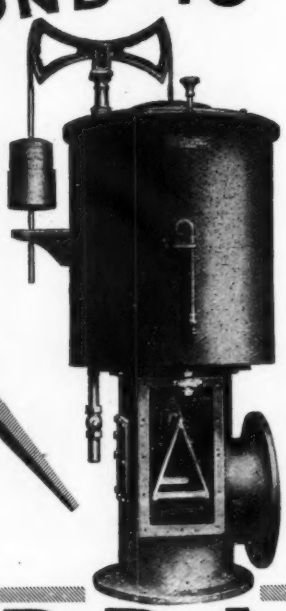

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Heat Transmission in Waste Heat Boilers

by
P. ST. GEORGE KIRKE,
M.A.(Cantab.)

In the course of a Paper read before the West of Scotland Iron and Steel Institute, an extract of which is given below, the Author set out the advantages of the new "Sinuflo" waste heat boiler which he has evolved after experiments extending over two years.

There are two main types of steam boilers; the water tube boiler and the fire tube boiler. Both types transmit heat from the gases in two ways, by radiation and by convection. Radiation accounts for about 60-70% of the heat transmission and utilizes the high grade heat, but convection has to do the most difficult work—namely, the remaining 40-30% with only the low grade heat. Each type of boiler has its own particular field and usefulness; both have their strong and weak points.

The water tube boiler is the only boiler that can be put forward when an evaporation in a single unit of more than 25,000 lb. of steam per hour is required, or for pressures above 250 lb. per sq.in. in large sizes.

Fire tube boilers are more suitable in most cases for industrial purposes, where pressures do not exceed 250 lb. per sq.in. and evaporations in single units of not more than 25,000 lb. of steam per hour are called for.

Transmission of Heat by Convection.

The heat transmitted to water surrounding a long fire tube having hot gases flowing through it varies according to the Author's experiments as the $V^{0.85}$ (V = Velocity).

The heat transmitted to water by a nest of water tubes arranged in staggered formation, with the gases passing over them at right angles to their axes, varies according to published experiments as the $V^{0.68}$.

The heat transmitted to water by a nest of water tubes arranged in parallel rows with gases passing over them at right angles to their axes varies according to published experiments as the $V^{0.654}$.

It follows that the water tube boiler with tubes arranged in staggered formation obtains but a slight advantage over one with tubes arranged in parallel formation, but that the fire tube boiler obtains a marked advantage over both when gas velocities are increased. For example, in the event of the velocity of gases being quadrupled in each case the heat transmission by convection is accelerated as follows:

In the fire tube boiler	3·25 times
In the water tube boiler with staggered fire tubes . .	2·57 ,,
In the water tube boiler with parallel fire tubes. . .	2·48 ,,

The fire tube boiler has another great advantage over the water tube boiler in that the combustion products passing into the fire tubes have only to be accelerated once, whereas in the case of the water tubes the velocity of the gases is accelerated and decelerated at every row of tubes.

I am of opinion that these are the two reasons why the fire tube waste heat boiler, which does practically all its work by convection, has nearly ousted the water tube boiler from the waste heat recovery field when pressures do not exceed 250 lb. per sq.in.

Necessity for Experimental Data.

Suppose hot gases are flowing through a fire tube surrounded by water. The temperature of the gases varies all along the tube from the inlet to the outlet. The density of the gases varies all along the tube. The velocity of the gases varies at every point. The thermal conductivity is changing. The specific heat of the gases varies as the temperature drops. Turbulence is diminishing from the inlet to the outlet. The percentage of heat transmitted by radiation and that by convection is varying all along the tube. As heat transmission varies as some power of all these variables, the said power in many cases not being known, it is obvious that no results are of any practical value unless they are obtained by experiment. Accurate calculation of heat transmission is completely beyond the mathematician, apart from experimental data.

Flue Areas Should Not Vary.

It was suggested some years ago, and the idea has been recently revived, that it would be advantageous to keep the velocity of combustion products constant in both water tube and fire tube boilers, by reducing the cross-sectional flue area as the temperature of the gases fell. The Author does not believe that idea is correct because it can only be done by increasing the draught drop *pro rata* with the square of the mean velocities. If you decided to increase your draught drop in any case, you could increase the weight of gases pulled through flues of constant cross-sectional flue area, which should give you as great a transmission of heat per unit of surface as could be obtained in the manner suggested. Suppose, for instance, gases drop in temperature from 600° C. to 250° C. when flowing over the heating surfaces. To keep the velocity constant the flue area at the outlet would have to be reduced by 40% and the mean flue area would be reduced by 20%, which would increase the draught required to handle the *same* weight of gases by 56%. If instead of reducing the flue area it were kept constant, this 56% increase of fan power would enable 16% more gas to be pulled through the flue, which would increase the evaporation per unit of heating surface about 14% and the output of steam by a similar amount. In the case of the boiler with the sectional flue area diminishing, 56% increase of fan power would not increase the output of the boiler at all, although the heating surfaces could certainly be reduced by an amount not exceeding 14%.

Turbulence.

Imagine again a fire tube surrounded with water, and hot gases flowing through it at a mean velocity of, say, 70 ft. per second. There are two forms of turbulence impressed upon those gases which very much assist the transmission of heat from the gases within the tube to the water outside the tube. The first, and by far the most important kind of turbulence, is that due to the entering velocity of the gases, which may be accelerated suddenly from 20 ft. per second to perhaps 100 ft. per second at the inlet end of the tube. This causes a tremendous disturbance of gas molecules, which is felt a long distance down the tube, the distance depending, of course, upon the actual acceleration obtained. This turbulence enables molecules of gas to transmit their heat content to one another and so to the tube walls much more quickly than if there were no such turbulence. Actually the creation of this inlet turbulence may absorb nearly 50% of the total draught required to draw the gases through the tube. Despite this turbulence, there is obviously no reason why a molecule of gas in the centre of the stream should move in any other than a straight line by the negative draught impressed upon it, which means that there is no reason why it should be able to push other and denser molecules out of its way and itself get to the tube wall. What happens is that the molecule takes the shortest path it can find from the inlet to the outlet of the tube, and passes its heat content to another molecule nearer to the tube wall, which in turn does the same. Thus the heat reaches the wall without the molecule originally possessing it itself getting near the wall. This is the reason why straight tubes have to be so enormously long if real efficiency is to be obtained with high mean velocities of gas flow. For example, a 90% transmission efficiency with a mean velocity of 70 ft. per second requires a straight tube about 160 diameters in length.

We carried out experiments recently to find out what percentage of the draught drop through a fire tube was absorbed in creating inlet turbulence, with the following results:

Distance from Inlet of Tube.	Draught, in Inches of Water.	Percentage of Total Draught.
2 in.	0·86	43
33%	1·37	68½
66 ,,	1·71	86
100 ,,	2·00	100

The New "Sinuflo" Patent Method of Accelerating Heat Transmission 150%.

In order to take advantage of the above, a new tube has been produced by the Author as a result of hundreds of experiments lasting over two years, the object being to enable many more molecules of gas that are not near the tube walls to arrive there and transmit their heat to the wall themselves. In practice this has resulted in an actual acceleration of heat transmission of 150%. Put in other words, the heating surface required has been reduced by 60% and the heat transmission per unit of heating surface has been increased in the ratio of 2½ to 1, as will appear below.

"Sinuflo" is a registered trade mark, which merely means "sinuous flow."

Gas Fired Boilers.

Fig. 1 illustrates an end view of a "Sinuflo" fire tube, and it will be noticed that the clear space through it is about 95% vertically and 65% horizontally.

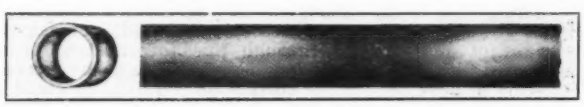

Fig. 1.

Fig. 2.

Fig. 2 is a view of a "Sinuflo" tube arranged horizontally, illustrating that the bottom of the tube appears quite straight and therefore there are no depressions in which moisture or dust can collect by gravity.

Fig. 3 shows a section in a horizontal plane through a "Sinuflo" tube, and it will be noticed that as a sphere will fit this tube at any point, a spherical brush, spherical scraper, or spherical rotary cutter is as easy to pass through the tube as a cylindrical brush, cylindrical scraper, or cylindrical cutter is to pass through a straight tube. It will also be seen that no flexibility is required between the brush, scraper, or cutter, and its shaft, because the clear axial space shown in fig. 1 allows the shaft to pass from side to side of the tube with the cleaning tool.

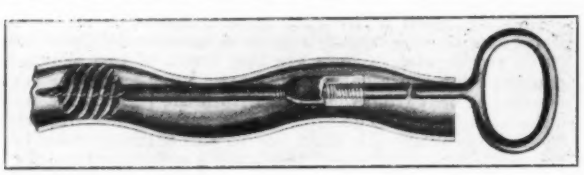

Fig. 3.

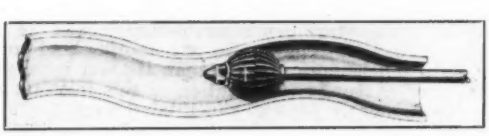

Fig. 4.

Fig. 4 illustrates a rotary cutter attacking scale in a "Sinuflo" tube. One of these tubes had hard cement scale built up within it so that only ⅜-in. bore was left. A standard rotary scaling tool used for water tube boiler was then tried and found to remove the scale perfectly easily in the manner indicated.

Referring to fig. 3 you will notice that the gases are always flowing towards the tube wall, first towards one side and then towards the other. Instead of the path of a molecule remaining in the centre of the stream, Newton's Law of Inertia causes it to resist its direction being changed; consequently it will endeavour to pass through other molecules towards the tube wall. A molecule in contact with the tube wall has its velocity reduced by the skin friction of the wall, and the velocity of a molecule in the centre of the stream will be greater than the velocity of any other molecule and its momentum will therefore also be greater. This enables molecules in the centre of the stream to approach the tube wall in resisting any change of direction, in accordance with Newton's Law of Inertia. They may not actually reach the tube wall, but in forcing their way between adjacent molecules having less momentum they give up their heat content to them more rapidly. In any case it is well known that hot gases flowing towards a heating surface will transmit heat more rapidly than hot gases flowing parallel to the heating surface.

A town gas fired "Sinuflo" boiler fitted with vertical tubes 2 in. O/D × 5 ft. long, submerged in water 4 ft. generally of the type illustrated in fig. 5 was independently tested by a Gas Company with the following results:

Date of test	January, 1933
Boiler diameter	1 ft. 6 in.
Tubes	2 in. O/D, 5 ft. long
No. of tubes	12
Tubes submerged	4 ft.
Internal wetted heating surface	22·1 sq ft.
Water evaporated	150 lb. per hour
Steam pressure	25 lb. per sq.in.
Feed	60° F.
Evaporation factor	1·176
Steam per hour	176 lb. from and at 212° F.
Percentage of full load	82
Evaporation per sq.ft. of internal submerged heating surface per hour	8 lb. from and at 212° F.
Chimney draught	*Nil*
Temperature of gases leaving boiler	204° C.
Temperature of water in the boiler	130° C.
Gas burned per hour	450 cu.ft.
Calorific value of the gas	500 B.Th.U. gross 450 B.Th.U. net
Gas per pound of steam from and at 212° F.	2·56 cu.ft.
Thermal efficiency unlagged	84%

We can arrive at the thermal efficiency lagged, by deducting the known losses from 100%, thus:

Heat carried away in the gases leaving the boiler	7·75%
Radiation loss when lagged	1·0 ,,
Thermal efficiency by difference	91·25 ,,

This boiler is entirely independent of chimney draught and a number of them have been made and installed for heating buildings such as schools, cinemas, &c. There is a separate gas jet opposite each tube and combustion takes

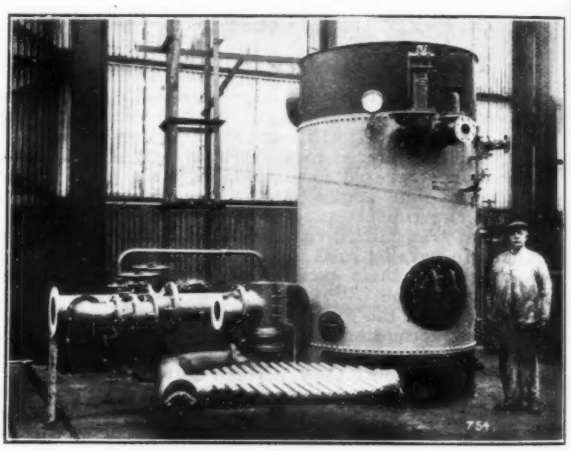

Fig. 5.

place *in* the tube, so that the bottom tube plate is not subject to any flame temperature at all, which enables them to be made for pressures as high as 750 lb. per sq.in. Moreover, there is no primary air and therefore back-firing troubles are eliminated.

These boilers are also suitable for Mond Gas, and fig. 5 illustrates one for evaporating 3,500 lb. of steam per hour, with the burner in the open position ready for lighting, the boiler being 5 ft. 6 in. diameter × 11 ft. high.

From and at 212° F. 8 lb. of steam per hour per sq.ft. of heating surface, combined with this very high thermal efficiency is remarkable for a boiler working without any chimney draught at all, at about 82% of full load, as it is equivalent to 9¾ lb. from and at 212° F. per sq.ft. of heating surface at full load under the same conditions.

Waste Heat Boilers.

The "Sinuflo" waste heat boiler occupies small floor space as compared with the best competitive practice for the same output and efficiency and the same size of tubes. Not only is half the floor space saved, but in addition the space required at the back of the boiler for brushing the tubes or for renewing them is also halved. The tubes are arranged in three nests with spaces between the nests large enough for a man to get in for cleaning the tubes on the water side. The path for the circulation of the water is greatly reduced in length so that the circulation is much more rapid than heretofore and this is assisted because the tubes are spaced further apart than in former practice, in order to enable them to be passed through the low temperature tube plate in the ordinary manner.

Fig. 6 is a photograph of a "Sinuflo" patent waste heat boiler which has been running continuously at the Dover

Gas-Works for several months. It will be noticed that the shell is made in one plate. The fan is driven by a geared steam turbine. In the doors of the outlet products chamber will be seen cast-iron closures and when these are removed there is a hole in the doors opposite each boiler tube, which enables the latter to be brushed, scraped, or

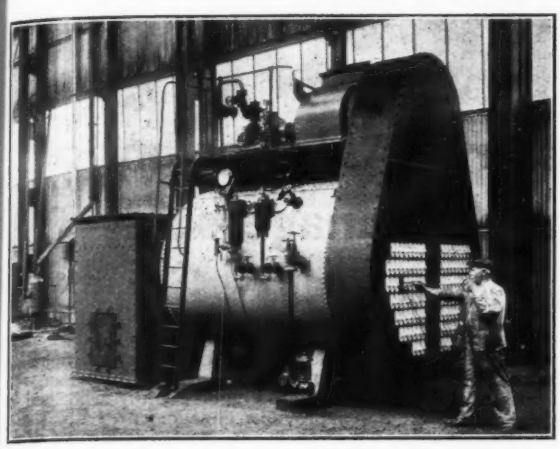

Fig. 6.

drilled while the boiler is running. When this boiler was started up steam was raised to 100 lb. pressure per sq.in. in 1¼ hours, and it was found that the temperature of the shell at the bottom did not remain cold as is usual, but rose in temperature with the top of the shell, thus eliminating internal strains which so frequently cause circumferential seams in shell boilers to leak. The explanation, of course, is the greatly accelerated water circulation as compared with previous practice.

Below are two comparative tests of a Kirke Patent 1918 type straight fire tube waste heat boiler and the new "Sinuflo" patent boiler illustrated in fig. 6. The figures in the first column marked with a star were published in November last year. The figures marked with a dagger are calculated from the published figures. It will be noticed that the evaporation per square foot of heating surface in the new boiler is 2·38 to 1 as compared with the old, and not 2½ to 1 as might be expected. The difference is due to the fact that both boilers require stay tubes and whereas the stay tubes in the old type of boiler are more efficient than the ordinary tubes, the stay tubes in the new type of boiler are much less efficient than the ordinary tubes, because they are straight instead of being waved, and are very short.

—	1918 Type. Plain Tubes.	1932 Type. "Sinuflo" Tubes.
Date of test	Published 1934	8/1/35
Hours run before test commenced	A few	2,200
Diameter of boiler	6 ft. 6 in.*	6 ft. 6 in.
No. of tubes to brush	282*	190
Clearance between tubes	⅛ in.†	1¼ in.
Length of tubes	15 ft 6 in †	8 ft.
External diameter of the tubes	1⅞ in.†	2 in.
External heating surface of the tubes	2,000 sq.ft.*	795 sq.ft.
Steam pressure in lb./sq.in.	105*	93
Superheater	Yes*	No
Draught at inlet of the boiler	0·75 in.*	0·7 in.
Draught at outlet of the boiler	2·25 in.*	2·5 in.
Total area through the tubes	495 sq.in.†	424 sq.in.
Temperature of water in boiler	172° C.*	167° C.
Temperature of the inlet gases	595° C.*	613° C.
Temperature of the outlet gases normal rnnning	261° C.*	247° C.
Temperature of the outlet gases after brushing	..	235° C.
Heat extraction efficiency including superheater, normal running	79·2%*	..
Heat extraction efficiency with no superheater, normal running	..	82·2%
Heat extraction efficiency with no superheater after brushing	..	85 ,,
Exhaust steam from engine driving the fan	To water softener*	..
Exhaust steam from turbine driving the fan	..	To atmosphere
Gross evaporation of water/hr.	3,365 lb.*	3,180 lb.
Coal carbonized in 24 hours	100 tons*	78 tons
Gross evaporation of water per sq.ft. of heating surface	1·68 lb.†	4 lb.
Ratio of gross evaporation of water per sq.ft. of heating surface	1	2·38
Gross evaporation of water per ton of coal carbonized	33·65 lb.†	40·8 lb.
Superheat	206° F.*	*Nil*
Water softener	Neckar*	Neckar
Capital cost delivered for without water softener and not erected	..	£980
Capital cost delivered and erected with water softener	£2,452*′	..
Waste heat derived from	Horizontal retorts*	Horizontal retorts
Duration of test	..	8 hours

Vertical Waste Heat Boilers.

The great reduction in tube length due to the "Sinuflo" method of heat transmission enables vertical induced draught fire tube waste heat boilers to be built to work with the exhaust gases discharged from horizontal gas-works retorts. Before one of these boilers was despatched from the Works, a brick combustion chamber was built underneath it, which was fired with coke, and the resulting figures are set out in the first column of the table following, the transmission efficiency through the fire tubes being 96% of that which is theoretically possible, with a draught drop of ¼ in. In the second column will be found the figures obtained when the same boiler was fired with the waste gases from the horizontal retorts. The transmission efficiency of the tubes has dropped to 90% owing to the draught drop having risen to 0·6 in.

—	Fired with Coke.	Fired with Waste Heat.
Date of test	12/9/34	30/10/34
Diameter of boiler	3 ft. 6 in.	3 ft. 6 in.
Length of tubes	8 ,, 0 ,,	8 ,, 0 ,,
Tubes submerged	6 ,, 6 ,,	6 ,, 6 ,,
Number of tubes	92	92
Internal heating surface of the tubes submerged	270 sq.ft	270 sq.ft.
Duration of test	4 hrs.	1½ hrs.
Temperature of the feed water	60° F.	130° F.
Steam pressure in lb. per sq.in.	71	65
Evaporation factor	1·191	1·117
Lagging	*Nil*	*Nil*
Water evaporated per hour	1,012 lb.	870 lb.
Average evaporation from and at 212° F. per hour	1,210 lb.	973 lb.
Steam from and at 212° F. per sq.ft. of heating surface unlagged	4 48 lb.	3·6 lb.
Average temperature of the gases entering the tubes	845° C.	400° C.
Average temperature of the water in the boiler	158° C.	155° C.
Temperature of the gases leaving the boiler	186° C.	180° C.
Transmission efficiency of the tubes	96%	90%
Condition of the steam	Dry	Dry
Average coke consumed per hour	104 lb.	Unweighed
Evaporation from and at 212° F. per lb. of coke, unlagged	11·64 lb.	..
Draught drop through the tubes	0·25 in.	0·6 in.

There is also made a twin drum vertical "Sinuflo" waste heat boiler for evaporating 16,500 lb. of steam per hour from waste gases discharged from horizontal retorts and comprises two 7 ft. 6 in. diameter drums, 9 ft. between the tube plates. The fan is driven by a compound reciprocating engine at the left top side of the boiler.

Alternatives to Reducing Tube Lengths.

As an alternative to reducing the length of a boiler shell, the number of tubes for a given diameter can be greatly reduced, their bore increased, the total flue area through the boiler increased and the heating surfaces made more cleanable on both the water and gas sides.

The advantages are:

(1) The number of tubes to be brushed is reduced 60%.
(2) The spaces between the tubes is increased 71%.
(3) The total flue area through the boiler is increased by 33%.
(4) The draught drop required for the same weight of gases is reduced by 43%.

The water surface for the liberation of steam remains unaltered.

Advance in Heat Transmission in 1912-1934.

One of the most remarkable performances in heat transmission with fire tubes accompanied with a thermal efficiency of over 90% was achieved by Professor Bone, F.R.S., and the late Mr. C. D. McCourt, who packed a tube with refractory granules and fired it with an explosive mixture of rich gas and air. In an actual boiler which was put into commercial use for some years a draught drop of 16 in. of water resulted in an evaporation of 14·4 lb. from and at 212° F. per sq.ft. of heating surface, with a thermal efficiency of over 90%. In 1920 a long straight tube fired by the Author with a non-explosive mixture of gas and air

produced heat transmission equivalent to 17·75 lb. of steam from and at 212° F. per sq.ft. of heating surface with a draught drop of only 8 in. of water. In 1934 heat transmission equivalent to 18·83 lb. from and at 212° F. per sq.ft. of heating surface was obtained in a " Sinuflo " tube with 1·15 in. of water.

Calculating the draught which would have been required in all three cases to achieve the last result, we find that the ratios of suction required for the three cases for the same performance are as 25 : 7·6 : 1, which means that in the last 22 years heat transmission has been accelerated in gas-fired fire-tube boilers to such an extent that only 1/25th of the draught is required to-day that was required then for the same performance.

Wales and Monmouthshire Association of Gas Engineers and Managers

Special Meeting at Cardiff

There was an excellent attendance at the South Wales Engineers' Institute, Park Place, Cardiff, on Thursday, July 18, when a Special Meeting of the Wales and Monmouthshire Association of Gas Engineers and Managers was held under the Presidency of Mr. Harold Barker (Llanelly).

The members were first addressed by Mr. W. R. Oliver, Display Officer of the British Commercial Gas Association, on " The Interchange of Display Units for Showroom Windows." When this address had been discussed Mr. W. A. Harper, of the Horseley Bridge & Thomas Piggott, Ltd., read a Paper on " The Klönne Waterless Holder." These two Papers together with the discussions that followed will be found on the following pages of this issue.

At one o'clock the meeting adjourned for luncheon at the Park Hotel by kind invitation of the Horseley Bridge & Thomas Piggott, Ltd., and the Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd.

The Loyal Toast having been honoured, Mr. F. B. Richards, Chairman, the Woodall-Duckham Vertical Retort and Oven Construction Company, proposed " The Wales and Monmouthshire Association of Gas Engineers and Managers." On behalf of Sir Sydney H. Holcroft Henn and his co-Directors he extended a hearty welcome to all present. He was glad to find that the membership of the Association had grown and had been thrown open to the manufacturers of plant. As a manufacturer of plant he supported the step which was appreciated as a friendly move. The President responding to the toast suggested that Mr. Octavius Thomas, their Honorary Secretary, would have been the proper person to respond to the toast for he had done much to bring the Association up to its present standard. He thanked Mr. Richards and went on to say that meetings such as they were then holding were the result of the spade-work done in committee rooms. The ramifications of the Gas Industry required thoughtful and careful consideration. It was only by pooling experiences that success could be achieved. In these days of competition no one man was able to guide the destinies of the Industry but he felt that their Association was able to put forward their claims. At no time in the history of the Gas Industry had team work been more vitally necessary.

" Prosperity to the New Steelworks " was proposed by Councillor George Williams, Chairman of the Industrial Development Council of South Wales and Monmouthshire, who wished the British (Guest, Keen, Baldwins) Iron and Steel Company, Ltd., all success in their new venture. He then referred to the part recently played by the firm and Mr. Madden in the organization of the Pageant of Industry before H.R.H. the Prince of Wales. The efforts of the Company and Mr. Madden were the cause of the success of the pageant. The enterprise of the British Iron and Steel Company was a great reply to the statement that Wales was the home of industrial unrest. In reply on behalf of the British (Guest, Keen, Baldwins) Iron and Steel Company, Mr. J. B. Deakin gave some interesting statistics relating to the East Moors Works.

" The Hosts " was proposed by Mr. W. H. Johns, M.I.Mech.E., Engineer and Manager of the Swansea Gas Light Company. He thanked the firms of Horseley Bridge & Thomas Piggott, Ltd., and the Woodall-Duckham Vertical Retort and Oven Construction Company for their kindness to them that day adding that he and his colleagues had had experience of the work carried out by them and had had nothing but satisfaction. These firms had every reason to seek future orders with confidence.

The toast was responded to by Mr. Bailey on behalf of Sir Sydney H. Holcroft Henn, K.B.E., Chairman of Horseley Bridge & Thomas Piggott, Ltd., who had to hurry away to fulfil a previous engagement. Mr. Bailey mentioned that his firm built the first gasholder in Berlin in 1770. It was refreshing and extremely gratifying to hear Mr. Johns speak as he had done of their firm.

Visit to the East Moors Works.

After the luncheon the members left by special conveyances to visit the East Moors Works by kind permission of the British (Guest, Keen, Baldwins) Iron and Steel Company, Ltd., to inspect the Klönne waterless gasholders being erected by the Horseley Bridge & Thomas Piggott, Ltd., and the coke ovens under construction by the Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd.

The smaller of these waterless holders has a capacity of one million cu.ft. and is to be used for the storage of coke oven gas while the larger, with a capacity of three million cu.ft., will be used to store blast furnace gas. The dimensions of the former are 99 ft. 9 in. in diameter by 152 ft. high and of the latter 141 ft. 9 in. diameter by 218 ft. 6 in. high. The majority of members climbed to the top of the smaller holder to inspect the piston and see for themselves the method of construction described to them by Mr. W. A. Harper in the Paper which he read during the morning's session. Some more adventurous spirits undertook to climb an extra 66 ft. to the top of the larger of these giants and were rewarded with a true bird's-eye view of the great East Moors Works.

The coke oven and by-product plant like the waterless holders proved to be of great interest to the visitors and the guides had a busy afternoon answering pertinent questions and indicating many interesting and novel features involved in the construction of the plant. The battery consists of 58 Becker combination ovens of the following dimensions: 43 ft. 0½ in. long by 12 ft. 6 in. high by 1 ft. 6 in. mean width. The capacity of each oven is 14 tons of dry coal per diem approximately or 1,100 tons for the battery producing 5,850 tons of blast furnace coke per week. The quenching station which is entirely automatic is in the form of a tower 56 ft. high above the rail level and incorporates a tank of 10,000 gallons capacity. A tall structure (135 ft. high) forms the coal bin and on the basis of 50 lbs. per cu.ft. has a capacity of 2,400 tons. The chimney reaches a height of 250 ft. with an internal diameter of 10 ft. 9 in., the walls tapering from 3 ft. 4½ in. thick at the bottom to 14 in. at the top with a firebrick lining to a height of 70 ft.

The primary coolers are the W-D vertical tube open top type to deal with 720,000 cu.ft. per hour at standard temperature and pressure. Electric detarrers of the W-D Whessoe type (suspended wire electrodes) are employed having an efficiency of 98% with a current voltage of 25,000. Rateau type exhausters having a normal capacity of 636,000 cu.ft. per hour (at inlet conditions) and capable of a maximum of 898,000 cu.ft. per hour are an interesting feature of the plant. There are three centrifugal driers of an approximate capacity of 600 lbs. of sulphate each. The saturators are lead-lined with an inside diameter of 12 ft. The benzole scrubbers are 100 ft. high and 10 ft. in diameter.

After the tour of the Works was completed the members were entertained at tea by courtesy of the British (Guest, Keen, Baldwins) Iron and Steel Company, Ltd.

The B.C.G.A. Scheme for the Interchange of Displays

Mr. W. R. Oliver, Display Officer to the British Commercial Gas Association, addressed the members on the subject of the Association's scheme for the interchange of displays, supply of posters, showcards, &c., along the following lines:

Interchange of Displays.

For some time past quite a number of members had approached the British Commercial Gas Association regarding a system of interchange of displays by which they would receive a regular supply of display material for a nominal yearly fee.

This question had been receiving very careful consideration and with that end in view a considerable amount of investigation had been carried out and the Association were able to put forward the following scheme: This would consist of a first-class window display supplied to members every fourteen days, four 20 in. by 30 in. showroom posters per month including one message frame, four thin or lorry posters, 20 in. by 30 in. per month, and six 18 in. by 12 in. showcards three times a year in the spring, autumn, and winter. The window displays would be constructed in the main in three sections that could be used individually or as a whole, thereby allowing for large or small windows.

The theme of the displays would touch on the general uses of gas for cooking, water heating, room warming, lighting, and refrigeration, and would be so designed that they would be topical and seasonable at all times of the year. The posters and showcards would be carried out on the same lines and would generally link up with the theme embodied in the national advertising issued by the B.C.G.A.

The displays would be interchangeable, but the posters, frame, and showcards would, of course, be the property of the undertaking. Twenty-six members were required in each area at the start of the campaign and each member would receive a different display. After a fortnight, members would receive a label for the forwarding of the display to the next undertaking on the rota and they would, in turn, receive a replacement display from another member. The message frame would remain in the possession of the undertaking, while new posters would be supplied monthly by the studio and new showcards three times a year.

It would be seen, therefore, that at the end of twelve months each member would have received twenty-six different displays during that period, and would have had for their sole use 96 posters together with a message frame and 18 showcards. The actual cash value would be in the region of £200. The studio would have in stock several substitute displays and should a display be in need of repair it should be sent back immediately to the studio and a substitute would be despatched by return. Repairs would be carried out to the damaged display in the studio. All displays would be packed in felt-lined crates which would be made specially for each display.

Members could enjoy the advantages of a continuous and ever-changing series of display units in their windows and showrooms for an annual inclusive fee of £20. Quite a number of members had been approached verbally regarding this scheme. It had received very favourable commendation and, as it was desired to inaugurate this system to commence with the autumn advertising campaign of the B.C.G.A., the views of members regarding the scheme would be appreciated and also an intimation as to whether they would be prepared to participate therein.

Discussion.

In opening the discussion the PRESIDENT (Mr. Harold Barker, Llanelly) said that they were all very much obliged to Mr. Oliver for putting the scheme before them.

Mr. W. H. JOHNS (Swansea) pointed out that the scheme had much to recommend it both to smaller and larger undertakings. Its use would save much time and the showroom staff's services could be utilized more for the sales side of their business. They would have first-hand information to put over to the public and such information would be handed round from undertaking to undertaking. The advertising too would be more of a national character. He went on to say that they would welcome such a scheme at Swansea, but emphasized that the people in London would have to think as they thought in the provinces. Things that were suitable for London were not necessarily suitable for South Wales, and the working classes in Welsh districts would not appreciate some of the advertising put forward in London and the southern counties. It was his experience that modern showrooms in the English counties were more or less standard, but in their district a number of them were suffering from old windows. The displays for interchange should therefore be suitable for their windows. He thought the fee of £20 a very cheap one for handing over to the public first-rate information, and added that they should grasp the scheme with both hands.

Mr. H. D. MADDEN (Cardiff) congratulated Mr. Oliver and said that he had listened with great interest to what had been said. With Mr. Johns he welcomed such a scheme. If one thought of the time that was spent in preparing posters to-day it was obvious that the scheme would save them money as well as rendering better service. He was, however, inclined to favour a monthly interchange, for it took about a month to put anything over and would be more suitable for their area than a fortnightly change. It was no use manufacturing a product if one could not sell it. Whenever he paid a visit to Grosvenor Gardens he asked to see the latest posters out and always bought some. When in London they should see what literature was going. The value of this service of the B.C.G.A. could not be overestimated. As an Industry they wanted to speak nationally and with such unity they would do a great deal towards making better showrooms. It was, after all, the window display that brought business.

Mr. J. H. CANNING (Newport, Mon.) also supported the scheme but at the same time he pointed to the importance of having advertising material suitable to the district. Mr. Johns had asked for a lot of Welsh publicity but that would not do for Newport. He was rather puzzled in regard to the other interchange scheme which was established at the end of last year. Briefly this scheme was as follows: When a consumer left any of their districts for another town, they undertook to inform that town so that they could get hold of the consumer before the electrical people. Although he had carried this out on many occasions he had not had any kind of intimation in return. It might be pointed out that he had been sending to places that were not affiliated to the scheme. Possibly the bulk of people who had joined the scheme did not think it worth carrying on. If such were the case then he thought it was high time that they dropped it. To every one of the 81 letters he had sent he had received charming letters in response, but there did seem to be some lack of co-ordination. He wished them to understand that he was not grumbling but only drawing attention to a peculiar lack of co-ordination that was not in the interests of the Industry.

Mr. B. J. BELL (Cardiff) added his congratulations to those previously voiced by contributors to the discussion and said that they had had long experience in the matter of window dressing and had achieved a certain measure of success in that direction. Window displays were a very important factor if they were co-ordinated with the other interests of the undertaking. He had a word of criticism to say and that was twenty pounds seemed too little. He had known that sum to be spent on a single window. Regarding the interchange of display matter by firms outside the Gas Industry, Mr. Bell said that to his knowledge there were at least five such firms who were willing to co-operate with gas undertakings in joint displays. The B.C.G.A. should not be behind these firms who had supplied advertising matter for so many years. Then again it would be fatal if a display ceased to be topical during the process of interchange.

Mr. D. A. PRATT (York) said that they had all listened to very interesting comment from Newport, Cardiff, and Swansea, but the position of a works with a staff consisting of a manager and clerk overwhelmed with work was somewhat different. The co-ordination of display work would be very useful to many undertakings in Wales and Monmouthshire, but the cost of the interchange scheme of the B.C.G.A. would be rather looked at askance by many boards of directors.

Replying to the points raised in discussion, Mr. W. R. OLIVER thanked Messrs. Johns, Madden, and Canning for their very instructive and constructive criticism, and at the same time wished also to thank those gentlemen for their support of the scheme. He knew their district well and realized fully the importance of appeal to the working classes. Regarding Mr. Madden's suggestion of a monthly rather than fortnightly interchange, he felt that if only two or three took up the proposal it could not be done. Mr. Bell had mentioned maker's displays, and he would advise them to make use of those displays and the makers would assist the retailers in selling their products. They would find that the type of display that was produced at the B.C.G.A. studio was different to the maker's display and had a different message to tell. It was easier to make a display about an appliance than to make one about gas which could not be seen. Therefore the displays of the B.C.G.A. would be of a different type to those sent by the makers. He advised them to show these maker displays and all displays that told the story of gas linked up with any appliance. However, he would point out that it was only common-sense policy to stipulate to anyone who wished to make use of one's showroom window that he must realize that the undertaking must have its share of the benefits of the propaganda. In conclusion he reminded the members that the B.C.G.A. was always only too delighted to help them in any of these matters.

The Klönne Waterless Gasholder

Following the discussion on Mr. Oliver's Address, Mr. W. A. Harper, of the Horseley Bridge & Thomas Piggott, Ltd., read the following Paper:

I was very pleased to accept your Secretary's invitation to attend this meeting and to give you a short Paper dealing with Klönne waterless gasholders.

The first gasholder of this type was erected at Dortmund Gas-Works, Germany, and has a capacity of 177,000 cu.ft. This holder was put into commission in January, 1928. Since that date more than sixty gasholders, including several repeat orders, have been erected or are in course of erection in many parts of the world, the capacities ranging up to 6 million cu.ft.

The principal advantages of the Klönne waterless holder over the water seal type are:

(1) Lighter weight in the steelwork owing to the water tank being omitted. This, combined with the elimination of the water load, permits of considerable saving in the cost of foundations. To take an example, a 3 million cu.ft. spiral-guided gasholder with steel tank would weigh approximately 1,300 tons, and the water in the tank would weigh about 24,000 tons, compared with a total of about 1,100 tons for a Klönne holder.

(2) For equal capacity the waterless holder requires a smaller ground area, which is a very important consideration where space is valuable. Taking the same capacity of holder—*i.e.*, 3 million cu.ft.—the water-sealed type would require a tank diameter of about 180 ft., against 141 ft. 9 in. diameter for the Klönne type.

(3) A practically uniform gas pressure is maintained for the entire capacity of the holder.

(4) In the event of a higher pressure being desired, this can be increased at a small cost by the addition of weights placed on the piston top. In this connection, it would be necessary to specify the maximum pressure the holder would be required to throw so that the piston could be designed accordingly.

(5) Due to the fact that the water tank is dispensed with, the stored gas is maintained in a dry condition.

(6) The maintenance cost of painting is less than with the telescopic type, where the lifts are subject to immersion in the water and subsequent discoloration.

The Steel Company's Holders.

By the courtesy of the British (Guest, Keen, Baldwins) Iron and Steel Company, Ltd., you will have an opportunity of inspecting at their Works this afternoon two gasholders of the Klönne type, and I feel I cannot do better than confine my remarks to a general description of these holders.

One of them has a capacity of 1,000,000 cu.ft. for the storage of coke oven gas, and the other of 3,000,000 cu.ft. capacity for blast furnace gas, the dimensions being 99 ft. 9 in. diameter by 152 ft. high to the top gallery for the former, and 141 ft. 9 in. diameter by 218 ft. 6 in. high for the latter.

As the design of both holders is on similar lines my subsequent remarks will apply to the larger one.

The shell or cylindrical portion is constructed of $\frac{3}{16}$ in. sheets and is designed in such a way that the same size of sheet is used throughout. These sheets, which begin at the foundation level, are riveted vertically to R.S. joists, which serve as columns, and horizontally to angles, which act as circumferential stiffeners. The sheets are butted to the columns and stiffeners so as to form a smooth interior surface, all rivets being countersunk and afterwards ground flush. The circumferential angles are firmly connected to the columns and serve the dual purpose of stiffeners and butt straps.

This shell consists of 46 courses in height, each course having 27 sheets in circumference, the size of each being 16 ft. 6 in. by 4 ft. 9 in. Galleries are provided about every 38 ft., these being useful for external inspection and painting purposes, as well as acting as stiffening members.

Within the shell there is a sliding piston which consists of a self-supporting cover having round its periphery a cup filled with oil. A flexible steel sheet ring, to which the sealing ring is attached, dips into the oil cup—that is, the bottom portion of this flexible ring dips into the oil. This ring is suspended by means of flat bars from the external framework of the piston, in such a way that it may oscillate. The seal is composed of 6 rings of special rubber and cotton, each ring being 4 in. by 1 in. in section, the whole ring being pressed against the interior of the holder by means of a number of weighted levers. It will be seen that the sealing arrangement is really a flexible joint and permits of expansion and contraction so that it will follow the exact contour of the holder shell. You will appreciate that this flexibility is necessary because it is not possible to make a cylinder of this diameter theoretically circular, apart from which it is well known that any holder shell will expand and contract as a result of temperature charges; therefore a most important feature of this type of holder is that the entire ring is so flexible that it will conform to any variations in the shell caused by wind pressure, temperature, &c.

While on the subject of the sealing arrangement, I would like to mention an alternative method which has been employed in obtaining the necessary flexibility. In this arrangement the oil cup is dispensed with, and, attached to the lower end of the continuous steel ring and the piston top curb, a specially constructed fabric is used. We are employing this method of construction in two small holders, each of 100,000 cu.ft. capacity, which we are at present erecting, and we find it equally as effective as the other method.

Gas-Tightness.

Regarding the tightness of the Klönne holder, there is no reason why it should not be "bottle tight." About two years ago my firm completed a 2 million Klönne holder at Port Talbot, and for the purpose of testing its tightness we recently conducted an experiment with white mice. The cage was taken on to the piston and carried round the seal; after a period of about half-an-hour the mice were taken out and there was no apparent difference in their condition. The obvious means of detecting leakage is, of course, by the human organs—the nose and ears.

As I have explained, gas-tightness is controlled by the sealing member being pressed against the shell by means of balance weights. If sufficient of these weights were eased a whistling noise would be heard where the packing had been released slightly from the shell, and the smell of gas would be pronounced. In consequence, any leakage so detected could be quickly remedied by adjusting the balance weights. To enable adjustments to be carried out, each lever is provided with a series of holes, and as there are five counterweights per lever it is an easy matter to adjust them.

One point which will come to your minds at this stage is "How long will the sealing ring last?" This is a question which I cannot answer definitely as it is only 7½ years since the first Klönne gasholder was erected. So far as the packing in this holder is concerned, it appears to be "still going strong." Up to date it is operating in a satisfactory way and the holder is absolutely tight.

Dr. Klönne, of the firm of Aug. Klönne. Dortmund. Germany, has carried out a large number of mechanical and chemical tests in connection with his patents. He has tested the packing ring mechanically by having a piece run as a tool on a shaping machine under pressure considerably greater than would be the case under actual working conditions in a holder. During the test the speed of travel was 45 ft. per minute, and the packing ran against a steel plate; the plate had no special treatment to render the surface smooth, but was in its original state. The total contact distance in each of the three tests carried out by Dr. Klönne was more than 60 miles.

In the first test, the packing was lubricated as is done under working conditions. In the second test, talc was used instead of grease, and in the third test half talc and half emery was used.

At the end of the tests, no wear or tear could be observed in the packing, and no loss of weight was found.

Dr. Klönne claims that the packing or sealing ring will not be destroyed mechanically in its service. Nevertheless the construction of the sealing ring provides for wear of about 1½ in. in its diameter, which means that the holder would be tight and working satisfactorily even if ¾ in. of the packing was rubbed off all round.

Chemically, Dr. Klönne has tested the packing by allowing a piece to lie in engine oil for more than seven years. In one test the fabric swelled considerably, which one

would naturally expect, but in another test where a piece of packing was held between two plates it showed no alteration from its original shape. The latter test is more in keeping with the conditions to which the packing is subjected when working in a holder.

It is said that oil destroys rubber—rubber is used in the packing, but not very much, the major content being cotton. I would point out, however, that specially prepared rubber is used.

I have explained the sealing arrangement at some length, because you will appreciate that it forms the most important part of this type of gasholder.

Piston Rollers.

To guide the piston up and down, two sets of rollers are used; all the rollers are located above the piston and therefore can be easily inspected, lubricated, and adjusted while the holder is working. The rollers are constructed of hard wood, the distance between the upper and lower sets being approximately 1/7th of the diameter of the shell, this spacing being ample to prevent tilting of the piston. The lower set of rollers is located immediately above the sealing ring, and the upper set is fixed to a horizontal girder (which also acts as a gangway) at the top of the external structure of the piston.

I would like to call your special attention to the fact that there is no metal-to-metal contact between the piston and the shell, so that sparking is impossible. A very important consideration.

It will be noted that the rollers are not guided during their travel, but are free to rotate on the smooth surface of the shell, and can therefore move horizontally as well as vertically, without binding. In actual practice it has been found that the piston does rotate to a certain extent, but as the shell is circular the piston is allowed to follow its natural tendency without restriction.

To reduce friction, a thin layer of grease is used between the shell and the sealing ring. The greasing is effected by means of loaded lubricators which can be adjusted to give the desired flow, and they are very simple and effective. The lubricators require to be refilled about every six to eight weeks for coal gas, but for unpurified coke oven gas they would need to be filled about every two weeks.

In the Port Talbot gasholder there are 96 seal lubricators, and a total of about 35 lb. of grease is used per week, which, of course, is not an expensive item of cost.

The grease used has been developed as the result of exhaustive experiments in the laboratory and in actual service. The consistency is like jelly, and it is physically static over an extremely wide range of temperature, with the result that it is effective under any climatic conditions.

Behaviour in Cold Weather.

You will, I am sure, be interested to know what is the behaviour of a Klönne holder in very cold weather, and I will read you an extract from a letter from the Engineer of the Gas Department of the Syracuse Lighting Company to Stacey Bros. Gas Construction Company, New York, who constructed a 6,000,000 cu.ft. holder at Syracuse.

> "As you probably know, we have recently experienced the coldest weather of which the Weather Bureau in Syracuse has any record. Two separate cold spells, one occurring at the end of December and the second at the end of January, both broke all records for low temperature in this territory. In the first instance, the official Weather Bureau temperature was 24° below zero and in the second 24·4° below zero. This temperature was recorded in the Post Office Building in the centre of the City. Reliable thermometers in the outskirts recorded a temperature as low as 35° below zero in the last cold spell.
>
> "We have no record of the temperature existing at the Klönne holder, but due to its exposed location, I believe the temperature was at least 30° below. Incidentally, this thermometer checks with the Weather Bureau thermometer almost exactly at all times.
>
> "A point that may interest you is that during neither of these cold spells was any difficulty experienced with the Klönne holder. Some frost was in evidence on the inside of the shell above the piston, and I presume that there was frost on the shell below the piston, but there was absolutely no effect on the piston travel except for a slight increase in pressure when the piston was travelling upwards. Following our usual practice, during the cold weather, we applied small quantities of glycerine and alcohol which may or may not have been responsible for the freedom of the piston movement. It might also be of interest to you to know that so far this winter, the coldest on record, we have used but 65 gallons of glycerine and 158 gallons of alcohol."

From this letter you will gather that a Klönne gasholder is dependable under any conditions.

With the Klönne type of holder, no pumps for the circulation of the sealing liquid are necessary, and in consequence motive power is entirely eliminated. The movement of the piston in an upward direction is limited by means of escape vents placed on the shell near the top, the sealing ring uncovering the ports allows the gas to escape to the atmosphere clear of the holder.

The top of the shell is covered by a roof and at its centre is fixed a turret, this being large enough to permit of access to the interior of the holder. Efficient ventilation is obtained by means of louvre ventilators placed round the shell under the top gallery and also round the turret on the roof. The interior of the holder is lighted by means of windows fixed in the roof.

Access to the top is effected by means of a stairway on the outside, and in the case of the holders you will see this afternoon, there is also an external electric lift provided for this purpose—this lift is capable of raising 4 persons (or approximately 5 cwt.), its speed being 120 ft. per minute, and it is arranged to serve both holders. An electric lift, and also a hand power arrangement will be installed inside the turret for access to the piston. This electric lift has a speed of 60 ft. per minute. To indicate the contents of the holder at any time a mechanical indicator is fitted, having a dial face about 7 ft. in diameter—the dial being fixed to the holder at the bottom gallery level.

To sum up, the Klönne holder is not only unique and ingenious, but it is extremely simple in operation, and the cost of maintenance is reduced to a minimum.

Method of Erection.

Regarding the erection of these holders, I will now give you a brief outline of the procedure we adopt.

In the first place, the bottom sections of the columns are erected and accurately plumbed, but not grouted; the fourth tier of side plates and the first gallery are then erected and a series of temporary bracings are fixed between the top of the fourth tier and the underside of the gangway. After this has been completed the bottom is plated and riveted, or welded *in situ*, and the first course of side plates erected and riveted complete. The bottom, which is erected on props, is now tested with water, after which it is lowered by means of lowering screws. The columns are now accurately checked for plumb and level and finally grouted. The plumbing of the columns must be very carefully carried out, as after the bottom sections are grouted it is impossible to rectify any defect in plumb of the higher sections of columns.

Rest blocks are fixed to the bottom tier of the shell and the piston material is now placed on the bottom plates ready for assembling. Light timber scaffolding for supporting the oil cup is placed at a level of the top of the first tier of plates. The cup is assembled on this scaffolding, riveted, caulked, and tested, the scaffolding now being dismantled and the cup lowered on to the rest blocks by means of lowering screws and links which are supported by means of a bracket at each column at the top of the fourth tier level.

The piston roof is now assembled and riveted up complete—during erection the piston framing is supported on timber framing from the bottom plates. The flexible apron plate and packing rings are then assembled, these being slung from the lowering screws which were used for the cup.

After the cup has been lowered and the second tier of plates erected, the remaining courses of shell plates are erected by means of a crane from the piston roof, the riveting and grinding of the rivets being proceeded with; the piston, blown up with air, is used as an erection platform. Before blowing up the piston, the sealing ring is protected by means of plates, this being advisable to obviate any harm being done to the ring during erection in the event of falling rivets, &c. The stairway is erected to suit the progress of the shell, and, on completion of the shell, the roof is assembled and riveted.

In the 3 million holder which we are erecting, there are approximately 700,000 site rivets. To enable the work to "come together" properly at site means very accurate shop work, and to ensure this all the shell plates, columns, and shell angles are drilled to a bush template.

So far as the speed of travel is concerned, the piston of the holder at Port Talbot travels at the rate of approximately 9 in. per minute, or about one mile every three weeks.

In conclusion, I would like to mention that all the material used in the construction of these holders is of British manufacture.

Well, gentlemen, the time at my disposal has not allowed

of my giving you anything more than a very brief description of the Klönne gasholder, but any questions that may occur to you will very gladly be answered when you inspect the holders, or at any other time.

Discussion.

The discussion was opened by the PRESIDENT (Mr. Harold Barker, Llanelly), who stated that they had had very interesting information put before them in the Paper. In these days of severe competition anything in the shape of apparatus that would mean reduction in their costs of production was of great interest, although he was careful to point out that nothing had been said in the Paper regarding costs.

Mr. H. D. MADDEN (Cardiff) said he would like to ask some questions on the Paper since he felt largely responsible for the presence of Mr. Harper that day. He had watched the waterless holders at the East Moors Works in course of erection and naturally took a great interest in them. They had caused a great deal of talk in Cardiff, where they were thought to be the biggest in the world by a certain section of the community. He wished to thank Mr. Harper for his Paper, both as a member of the Gasholder Committee of The Institution of Gas Engineers and on behalf of the Association who were always anxious to learn anything about holders and carbonizing plant that would be of assistance to them. Mr. Johns and himself had seen the waterless holder at York during the course of erection, and the material and construction of the sealing ring of the piston interested them very much, and with lubrication that material would stand for a great number of years. With regard to the waterless holder at Port Talbot which had been erected by Mr. Harper's firm, Mr. Madden wanted to know if it was for the storage of blast furnace gas.

Mr. HARPER: Yes, it is for the storage of blast furnace gas.

Continuing, Mr. MADDEN then asked if the blast furnace gas was washed to remove sulphur compounds, and if not, what was the effect of those compounds on the plating of the holder. Regarding concrete foundations he wished to know to what depth the feet of the columns were put into the ground. The question of dry gas from an engineer's point of view and the constant pressure whatever the position of the piston were very interesting points.

Mr. W. H. JOHNS (Swansea) joined with Mr. Madden in thanking Mr. Harper. He had had the privilege of inspecting two holders of the waterless type at York, in its early stages, and at Port Talbot, and felt that he ought to say that he was very impressed with the simplicity of the work which must lower the cost of erection. Also with the Klönne the watching of the tar seal was obviated. This got rid of one of the most serious drawbacks of the waterless gasholder. Mr. Harper had referred to the fact that for the bottom plates they had used welding but had mentioned the very large number of rivets used. Was it advantageous to rivet at the top and employ welding at the bottom? He thought rivets were a weak point and if welding were used it would prevent a lot of corrosion as well as making for economy in construction.

The PRESIDENT then announced that they had with them that day the Deputy Engineer of the Beckton Works of the Gas Light and Coke Company, Mr. Stephen Hay, and asked him if he would be kind enough to say a few words.

Mr. STEPHEN HAY thanked the President for his kind reference and said that he would like to join in congratulating the author. He mentioned that they had six waterless gasholders in his Company, but none at the Beckton Works. They found in London that a lot of money was spent in painting waterless gasholders owing to the complaints of borough surveyors. With regard to the effect of temperature he said that in London they would get over that difficulty soon enough if only they could get a temperature low enough to get good consumptions.

Mr. W. CLARK JACKSON (Neath) wanted to know how Mr. Harper suggested caulking up a rivet should one be found leaking. They had been told that the rivets were flush inside the holder and he wondered if the use of a holding tool had any effect on the gas-tightness of the holder.

Mr. J. H. CANNING (Newport, Mon.) observed that one of the points regarding waterless gasholders was the question of leakage between the piston and the enclosing envelope of the holder. One heard statements that there was a slight percolation. Mr. Harper had given them indirect evidence of this percolation, but he wanted to know if there were any direct evidence. He also wished to know how long one would have to throw a waterless holder out of operation to renew the sealing ring. Also could the Author give them any idea of the saving affected in the erection of the waterless type as compared with a water-sealed holder?

Mr. C. H. DAVISON (R. & J. Dempster, Elland) mentioned as an example of the gas-tightness of the seal of a waterless holder that a pigeon built a nest in the crown of the 8 million cu.ft. holder at Southall and reared its brood there.

Mr. E. M. EDWARDS (Port Talbot) asked if this type of holder could be erected so as to provide for an easy method of re-levelling in the event of subsidence. He also wished to know what the Author recommended in the way of treating the metal to resist corrosion and what prime coat was put on to the metal.

In reply to Mr. Madden, Mr. W. A. HARPER said that the blast furnace gas at Port Talbot was cleansed down to below 0·02 grain of dust per cu.ft., and was delivered to the gasholder (where oil was used as a sealing agent) at atmospheric temperature, or possibly 2 to 4° above that. It was saturated with water vapour and an average analysis of the gas was as follows:

CO_2	2·89 %
O_2	0·87 ,,
CO	24·91 ,,
H_2	3·01 ,,
N_2	59·32 ,,

It would be seen therefore that sulphur compounds were absent and since the holder was swept to full capacity the grease would assist in the prevention of any corrosion. The columns were fixed beneath the bottom plates and were secured by holding-down bolts five or six feet long. In reply to Mr. Johns he said that since they were working the holder at Cardiff to outside limits of ⅜ in. they could not afford to risk any distortion. Rivets were employed for the piston, sides, and roof. Mr. Hay had raised the question of the beauty of the waterless holder, but he would maintain that it was not objectionable and no one should complain of slight discoloration. Replying to Mr. Canning's query as to whether there was any direct evidence of percolation between the piston and the sides, he said that he had been inside a holder of the waterless type while it was working, and, although he had no direct evidence, he felt no ill effects after one hour. No direct measurements had been carried out in respect of percolation. Regarding the time required to renew a sealing ring, he said that a week would be ample time for that operation. So far as economy was concerned, he was afraid that they would have to go up to a capacity of two million cu.ft. before the waterless gasholder would show any economy over the water-sealed type. At a capacity of three million cu.ft. he said a saving of about 5% could be shown. With greater capacities than that the increased economy would be considerable. The question of subsidence was one of the points that was taken up with these holders, and in the Ruhr, where there was much subsidence due to the mine workings, waterless holders were used on that account. As a rule piling was unnecessary although they had found it necessary on one one-third of the circumference of the smaller holder at Cardiff. Owing to the very light loading on the foundations no one need fear that a waterless holder would get out of level. With regard to the painting of these holders as yet no painting or oiling had been done and all that was required before painting was wire-brushing. In his opinion red lead was the best prime coat. The possibility of a leaking rivet was tested for by running the piston up and down a number of times and testing with soap suds, &c. The riveters held back from the outside and riveted from the inside. They always gave their holders a very stringent test and there was little chance of any leakage. He had never heard of any case of where rivets had leaked.

Mr. A. DYSON (Horseley Bridge and Thomas Piggott, Ltd.) said he would like to correct a misapprehension that might exist as a result of what the Author had said with regard to the economy effected by the erection of waterless holders as against water-sealed types. A 100,000 cu.ft. holder which his firm made showed a saving when foundations were taken into consideration.

A Vote of Thanks.

A hearty vote of thanks to Messrs. W. R. Oliver and W. A. Harper was proposed by Mr. H. MATTERFACE (Monmouth), the President-Elect, and ably seconded by Mr. D. W. DAVIES (Tredegar).

Gas in the Working Class Home

Sir Francis Goodenough, C.B.E., who is a Vice-President of the 14th International Housing and Town Planning Congress, presented a Paper before that assembly in London last week.

Dealing with "Gas in the working class home" and its bearing on the rehousing of the people in Great Britain, he said that planned dwellings demanded a planned heat service. All the town-planner's work was wasted without the provision of an economical and labour-saving fuel, for otherwise the régime of drudgery, with its certain end in dirt and squalor, would continue as of old.

Sir Francis went on to describe how gas served the needs of the working class home in cooking, water heating, room warming, home laundry, and lighting, and gave details of a standardized heat service. After a description of installations of such equipment in housing schemes in various parts of the country he referred to the educative work being carried out by the Gas Industry, and said that the removal to better constructed and equipped dwellings made necessary the education of tenants to ensure that there should be no return to the insanitary conditions of old. The Gas Industry was proving to both the present and the coming generations that cleanliness, health, and comfort went together and need not mean a perpetual round of housework and drudgery.

French Gas Industry

Review of the 58th Congress of the Union Syndicale de l'Industrie Technique du Gaz en France

The 58th Congress of the Union Syndicale de l'Industrie du Gaz en France took place in Marseilles between June 3 and 5, 1935, under the chairmanship of the President, M. Léon Carpentier. M. Alfred Bazille was elected President for the ensuing year.

Prizes of 5,000 francs each were awarded to Messrs. Sabrou and Delsol for the Papers presented by them to the 1934 Congress, and M. Forrières received a prize of 3,000 francs for his Paper.

The number of Papers presented this year was an exceptionally large one and a number of important topics were discussed.

We commence, this week, our summary of the Reports and Papers.

Measurement of Surface Temperatures.

A. Gouffé described an apparatus for the accurate measurement of the surface temperature of walls in the range 0-80° C.

One form of apparatus consists of a mercury-in-glass thermometer with a flattened bulb which can be pressed against the surface. The bulb is surrounded with a cup filled with cotton wool. A preferable form of instrument comprises a copper-constantan couple. The wires are enamelled for purposes of insulation and are 0·2 mm. in diameter. The couple is wound into a flattened spiral for a length of 4-5 in. from the hot junction which forms the centre of the spiral and the spiral is then mounted on a disc of clay and sodium silicate. The back of the disc is fastened to a head-piece with the intermediary of a block of insulating material. The free ends of the couple pass into a Dewar flask containing water and serving as a cold junction box. The spiral and attachment are fastened to an ebonite stopper in the Dewar flask. A precision potentiometer serves to measure the e.m.f. developed when the flask is brought near to a surface so that the spiral presses against the latter.

The instrument is calibrated against an upwardly facing horizontal wall of known temperature secured by means of an electrically heated cylinder of lead 6½ in. in diameter and 8 in. high. Heating is effected by means of a heater element beneath the cylinder which latter is surrounded with insulating material on all sides except the top. Four horizontal iron-constantan couples, spaced equidistantly 2 in. one from another and having their tips in the axis of the cylinder, serve to measure temperatures in the cylinder in conjunction with the potentiometer. A temperature gradient curve is plotted and extrapolated to enable the surface temperature of the exposed face of the cylinder to be deduced. The power employed varies from 13 watts (0·8 amps. and 16 volts) to 50 watts (1·5 amps. and 33 volts) depending on the rate of heating. Temperature measurements are taken when steady conditions have been established.

The e.m.f. developed by the instrument when placed against the test wall at a definite temperature agrees fairly closely with the calibration curve obtained when the instrument is immersed in an oil bath and still closer agreement is obtained if a drop of liquid paraffin is placed on the wall before the instrument is applied. The apparatus has been calibrated under both sets of conditions.

Errors inherent in the apparatus and those due to variations in atmospheric temperature and in the nature of the wall are discussed. It is claimed that surface temperatures up to 80° C. may be measured with an error not exceeding 0·5°.

Thermostatic Control of Instantaneous Water Heaters.

M. Richard pointed out that individual instantaneous water heaters are more economical than centralized storage water heaters in blocks of flats since heat losses during idle periods are avoided. Other drawbacks of a centralized hot water supply are the likelihood of waste and of excessive use of water, pressure losses, scale formation in the pipes and high maintenance costs for joints, mains, and valves.

Instantaneous water heaters should preferably be provided with thermostatic control so that water at a definite temperature is delivered. The form of control is preferably such that the gas supply is controlled by the temperature of the hot water rather than by the volume of water passing through the appliance. A suitable type of thermostat takes the form of a liquid-filled tubular chamber having a flexible metal bellows at one end. The bellows portion is in the gas supply pipe and the free end of the bellows forms the seat of the gas supply valve. The device is actuated by means of the vapour pressure of the liquid contained in the tubular chamber which is situated in the hot water outflow pipe.

When supplies of water at two different temperatures are required, one appliance suffices since it may be arranged, for example, to deliver water at 150° F. to a scullery and water at 120° F. to a bathroom if the branch leading to the bathroom is fitted with an automatic tempering device which admits the necessary quantity of cold water.

Appliance manufacturers have been loth to embody thermostatic control in instantaneous water heaters since an increase in development and production costs would be entailed and the increase in production cost would be multiplied several fold through intermediate profits before the appliance reached the consumer. The price which the latter would have to pay might then be regarded as prohibitive. However, since gas occupies a unique position in relation to instantaneous water heaters and since only the best is good enough for the Gas Industry, it is to be hoped that thermostatic control will soon become standard practice in spite of all difficulties.

High Pressure Gas Distribution.

G. Julien-Laferrière described the installation of a high pressure main to supply coke oven gas to a number of villages. A seamless steel main with welded joints and 5 in. in diameter was employed. The length is 12 miles. A maximum supply of 21,000 to 25,000 cu.ft. of gas per hour is ultimately contemplated. At present, however, only half of this quantity is distributed and two compressors were installed, each capable of compressing 10,500 to 12,500 cu.ft. of gas per hour to a maximum gauge pressure not exceeding 42 lb. per sq.in. One compressor thus serves as a standby. Subsequently, a further compressor of similar capacity will be installed and two will then be in use. To enable the system to be capable of automatic working, rotary compressors, direct coupled to motors, were decided upon. They are of the single-stage type and are water-cooled. At the suction end of each compressor is a ceramic filter fitted with a differential gauge which serves to indicate when cleaning of the filter is necessary. The driving motors are housed in a separate building and the couplings pass to the compressor house through stuffing boxes.

The gas is measured with a " Delta " dry meter of the indicating, recording and integrating type, fitted, additionally, with a recording barometer, pressure gauge, and thermometer.

A safety device consisting of a manometer of the ring-balance type shuts off the compressor if the gas pressure falls below a predetermined amount which may be set at any value between 2 and 8 in. W.G. Operation of the compressor is controlled with the aid of a manometer fixed on the high pressure main and fitted with two adjustable contacts. The motor starts up when the pressure in the distribution main falls below a given value and shuts down when the pressure exceeds a given value. The range between these pressures is of the order of 5-7 lb. per sq.in. In the unlikely event of a failure of this manometer, a counterpoised flap valve of the normally closed type opens and by-passes the compressed gas back to the suction end of the compressor.

The main is provided with a series of seal pots of which the size decreases as the distance from the supply station increases.

Each of the villages has its own reducing valve and a holder fitted with an automatic control which causes gas to enter the holder when the gas content falls below a predetermined amount and shuts off the gas when the holder is full.

The mode of operation of the whole system is as follows: When the holders are full, their inlet valves become shut off but the compressor continues to force gas into the main until the pressure builds up sufficiently to actuate the cut-out of the motor. The holders progressively empty and,

when the level of one or other of them comes down to the predetermined valve, its inlet valve opens and gas enters the holder. This causes the pressure in the main to fall and the compressor motor automatically resumes work.

The installation has been at work with every satisfaction for close upon a year.

Small Rapid-Delivery Storage Water Heaters Serving Several Points.

F. Carrière described the method adopted in some large groups of tenement dwellings in Paris to provide a hot-water supply to a scullery sink and to a shower bath and sink in a wash-room. A gas-heated storage water heater of 1¾ gallons capacity is supplied with water from an overhead constant-level tank which also supplies a tempering tap in the wash-room. The hot water outlet pipe from the water heater is connected to the scullery tap and to the tempering tap. Hot water can be drawn off in the scullery and warm or hot water is obtainable from the tap of the shower bath or sink in the wash-room depending on the adjustment of the tempering tap.

The system was decided upon after difficulty had been experienced with a somewhat similar arrangement connected directly to the water main. Under these conditions, excessive pressures, leading, occasionally, to bursting, developed in the water heaters and this could only have been obviated by the use of a much more robust and expensive type of heater. Other difficulties were also encountered with such an arrangement but, with the introduction of the constant-level tank, all these difficulties disappeared.

Unknown Solvents Affecting Rubber Gaskets.

In continuation of his earlier work, R. Forrières described experiments as a result of which liquids having a solvent action on vulcanized rubber were isolated by the steam distillation of deteriorated rubber gaskets taken from the distribution system and by the distillation of spent oil from a naphthalene scrubber. The fractions which possessed this solvent action had boiling points in the ranges 70-80° C., 80-88° C., and ± 115° C. Their action is accelerated by water and ammonia. Benzene and toluene possess the power of causing vulcanized rubber to swell though they do not dissolve it, hence they are not responsible for the solvent action. The active materials in the fractions have not been identified but, in view of their properties, the possibility is indicated that compounds similar to tetrahydrobenzene and dihydrobenzene may be concerned in the lower boiling fractions and an unknown material in the fraction boiling at 115° C. Such substances would not be found in purified benzole since they would be removed during the acid wash. This may account for their not having previously been recognized.

The fact that rubber solvents are, to some extent, present in spent oil from naphthalene scrubbers and are, therefore, to some extent removed from the gas during the course of naphthalene extraction leads to the view that one merit of benzole scrubbing may be the possibility that these unknown rubber solvents may be removed from the gas simultaneously with the benzole with a consequent improvement in the life of rubber gaskets in the distribution system.

(To be continued.)

The Tottenham Gas Order

An application by the Tottenham and District Gas Company for a Special Order under the Gas Undertakings Acts, 1920 to 1934, was enquired into by Mr. J. F. Ronca (Director of Gas Administration) at the offices of the Board of Trade in London on Friday, July 19. The Tottenham Company was represented by Mr. Jacques Abady, K.C., and there were also present representing the Company Mr. Henry Woodall (Chairman), Mr. H. C. Smith (Chief Engineer), and Mr. E. J. K. Fussell (Secretary). There was some opposition, although not of a very serious nature. The Middlesex County Council was represented by Dr. Harold Williams, the Biggleswade Urban District Council by Mr. P. R. Chaundler, and the Luton Gas Company by Colonel Cox, of Messrs. Dyson, Bell, & Co. The Woburn Gas Company was also represented, but they did not go into detail as regards their objection and left the point they raised to be decided by the Director.

Mr. ABADY, K.C., outlining the details of the Draft Order, said that it was proposed to acquire certain gas undertakings and to add the areas of these undertakings to the limits of supply of the Tottenham Company, and, in addition, further to extend the limits of supply of the Tottenham Company by taking in certain other small areas which, however, were more of the nature of adjustments. Powers were also asked to manufacture gas on lands adjoining the existing Hertford Works of the Company and also to manufacture gas on lands owned by the Stevenage and Shefford Companies—to be taken over—these being not-statutory companies.

Before dealing with the proposals in the Order, however, so far as they affected the acquisition of other companies, Mr. Abady referred to Clause 27 relating to the power to lay pipes outside the limits of supply. He suggested that Clause 27 should be amended by adding a further paragraph describing precise routes for the mains to be laid by the Tottenham Company through the Luton area, and should there be any doubt as to the sufficiency of the wording he imagined that the parties would be willing to accept a decision by the Directors of Gas Administration. The desire of the Luton Company was that nothing should be done under the clause which would interfere with any of the Luton mains at present existing or make it difficult to lay mains in the future, and, of course, the Tottenham Company fully appreciated that desire. It was agreed that no use should be made of such mains for the purpose of supplying consumers in the Luton area.

Colonel COX, for the Luton Gas Company, said his Company had always worked in amity with its neighbours and would certainly continue to do so with such a neighbour as the Tottenham Gas Company. There was no desire on the part of the Luton Company to be in any way obstructive. It was agreed that the Tottenham Company should have the right to lay a corridor main through the Luton Company's area of supply in order to link up portions of what would become the Tottenham Company's area should the present Order be granted, but it was desired that the Luton Company should have the right to make representations as to the position and method of laying such mains. The point was that there might be certain roadside waste portions of land sufficiently large to accommodate future mains of the Luton Company but not sufficiently large to accommodate also mains of the Tottenham Company, and it was not desired, for example, that the Tottenham Company should snap up the cheapest positions and prevent the Luton Company, in their own area, from being able to use them in the future. Although he had no doubt the parties would be able to agree a form of wording to give effect to this desire of the Luton Company, that Company would be willing to agree to a decision of the Director in the matter.

The DIRECTOR expressed the hope that the parties would be able to agree among themselves.

Mr. ABADY expressed the view that it would be desirable to have something in the nature of a standard clause to deal with these cases, adding that the giving of notice to the highway authority in such instances did not give the local gas company any right to make representations.

Colonel COX remarked that this point would become increasingly important in the future and suggested that efforts should be made to prevent anything in the nature of a triangular duel as between the local gas company, the county council, and the outside company wishing to lay mains in the local company's area.

Mr. ABADY agreed that such a state of affairs should be avoided.

The position was left that the parties should endeavour to draw up a form of wording which would meet the object which had been discussed, and to submit it to the Board of Trade.

Mr. ABADY then proceeded to deal with the proposals in the Draft Order. He pointed out that the Tottenham Company acquired a controlling interest in the Hitchin Gas Company, which was a statutory Company, on Oct. 16, 1932. On Sept. 25, 1934, it acquired the Biggleswade Gas Company, which was operating a statutory undertaking authorized by Provisional Order. On Oct. 16, 1933, it acquired the non-statutory Stevenage Gas Company, and on Dec. 18, 1934, it acquired the Shefford Gas Company, another non-statutory concern. One of the objects of the present Order was to transfer the areas of these four companies to the Tottenham Company and also certain other small areas which were at present no man's land. It was also material that it should be stated that the Tottenham Company had acquired on March 27, 1935, the undertaking of the Dunstable Company, which was a statutory Company, but this did not form part of the present Order because the transaction had taken place since the Order was deposited.

Speaking of the opposition to the proposals in the Order, Mr. Abady said there had been a great many, but most of them had been withdrawn owing to agreement having been come to. So far as the Woburn Gas Company was concerned, there was a clause in the Order debarring the Tottenham Company from supplying in Woburn without the consent of the Woburn Company, but that Company was not satisfied and asked that there should be a permanent prohibition on the Tottenham Company from giving any supply whatever in Woburn. It might well be, however, that the Woburn Company would find it advantage-

us in the future to take a supply of gas in bulk from the Tottenham Company, and the Order provided for the sanction of the Woburn Company to any supply being given there. The remainder of the opposition was confined to the question of differentials. The Middlesex County Council opposed on the ground that the Tottenham Company could justify the differentials proposed, and in particular suggested that the 5d. differential in Biggleswade was too low, whilst the Biggleswade Urban District Council put forward the case that the proposed 3d. differential in Biggleswade was too high. There was no objection to the differentials being compulsory for three years with the right of the local authorities to apply for a revision. The Directors of the Tottenham Company held the view very strongly, however, that all differentials should be permissive in order that gas might be supplied at the lowest possible price according to circumstances without necessarily waiting for a period of years, as was the case with a compulsory differential.

In regard to all the areas which would come under the control of the Tottenham Company if the present Order was sanctioned, Mr. Abady pointed out that the charge for gas would be lower than it is at the present moment, and he urged this as justifying the scheme in the interests of the consumers.

Commenting on the terms of purchase of the companies referred to in the Order, Mr. Abady said that the Tottenham Company had purchased the whole of the ordinary shares for cash, and that stood in the books of the Company as an investment in place of cash. In certain cases there were some redeemable preference stock and some mortgage debentures outstanding, and the preference stockholders would be given a like amount of stock, as would the debenture holders in the Tottenham Company.

Under Clause 26 of the Order, power was sought to manufacture gas at the existing works of the Shefford Gas Company, and also of the Stevenage Company, as well as on a piece of land adjoining the Hertford Works. The latter was an extension of existing statutory powers, but Shefford and Stevenage were non-statutory companies, and if there was any objection to manufacturing gas at these places the Company would be content with powers to store gas there.

Mr. *H. C. Smith* (Chief Engineer, Tottenham and District Gas Company) spoke of the scheme that is in hand for linking up Hitchin, Stevenage, and Dunstable, and mentioned that the Hitchin Works were being reorganized. They were already connected with Stevenage, Shefford, and Biggleswade, manufacture at all three latter places having been discontinued. The supply to Stevenage was being given by high-pressure mains from Hitchin and was then put into the low-pressure distribution system, the same process being adopted in the case of Shefford and Stevenage. When this scheme was completed it would only be necessary to lay a short connecting main to link up with Hertford, and then all the Company's manufacturing stations would be interconnected.

Mr. Smith gave details of how the differentials had been arrived at.

There was no serious cross-examination of Mr. Smith, and the enquiry closed.

Activity at Greenock

Vertical Retort Plant Reconstruction

To cope with the increasing demand for "the cheapest heat on tap" and to take advantage of the latest developments in carbonization practice, the Greenock Gas Department have recently put in hand considerable reconstruction work at their Inchgreen Works.

Four settings of four retorts each which were last rebuilt in 1925 are now in the process of reconstruction. The work involves the substitution of external producers for the internal type at present used to heat the retorts, and an alteration in the system of heating the retorts from downward heating with recuperation to upward heating without recuperation. By adopting these principles of design it is considered possible to materially increase the number and capacity of the retorts which could be built inside the existing retort house; increased working efficiency is also expected without the expense of providing another retort house complete with coal-handling equipment, &c., on a new site.

One half of the carbonizing plant—viz., 4 settings of four retorts each, has been completely dismantled and is being replaced by two units each of ten upwardly-heated retorts. These retorts are to be heated by producer gas from four step-grate producers at ground level complete with foundations and capable of utilizing breeze. The new producers are housed in a structure built as an annex to the east-side of the retort house; the overhead coal and coke hoppers are being renewed and reconstructed where necessary to suit the re-arrangement of retorts and producers. Provision is being made for the inclusion of an additional waste-heat boiler and suitable coke-handling and producer ash-handling equipment.

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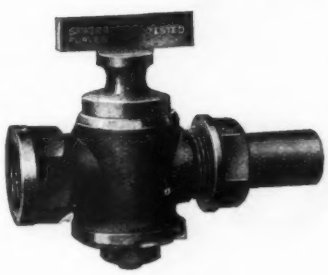

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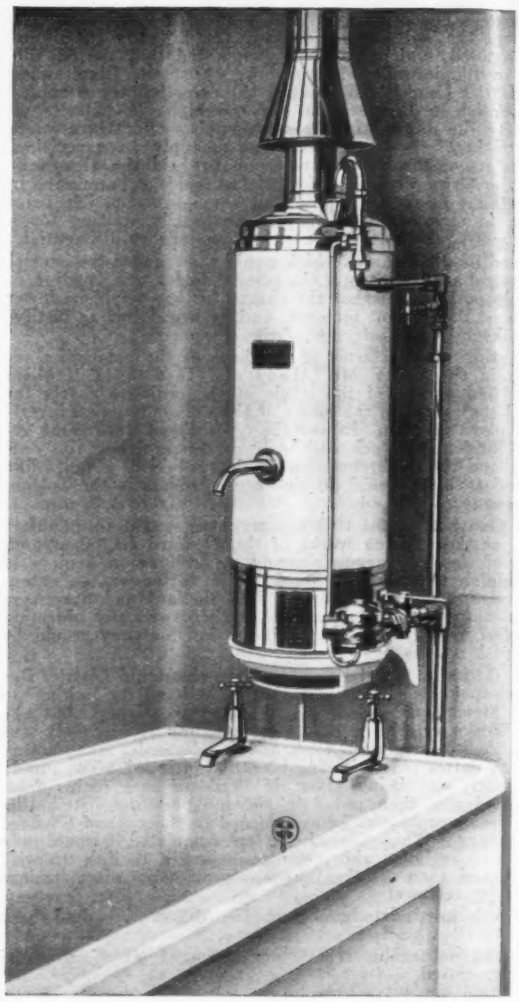

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Gas Markets and Manufactures

Stock Market Report

(For Stock and Share List, see later page)

The Account which closed last week was for the most part dominated by the large number of new issues, while other influences of a conflicting nature also curtailed the volume of business. Prices in most sections, however, have been well maintained, particularly those of the Funds and other investment stocks, and the general undertone is good with confident hopes that when the holiday season is out of the way more active conditions will prevail in all departments. This week sees the opening of one of the unpopular "three week" Accounts, so that no very great change in the general position is anticipated.

The volume of business in Gas stocks and shares was about on a par with the previous week, and though prices were inclined to harden the number of changes in quotations was almost negligible. The general tendency lately has been towards a narrowing of margins, and last week Gas Light units went to 28s.-28s. 6d., showing a gain of 3d., and South Metropolitan ordinary closed at 124-127, against 123-128. On the local Exchange, Bristol ordinary recovered a point of the *ex* div. reduction with a rise of 1 to 121. Otherwise prices remained practically unaltered.

The first of the three Metropolitan Companies to announce its interim dividend is that of the Commercial Gas Company, which is maintaining the usual 2½%. The Company's stock has been standing at a very low price for some time, and at the present quotation of 106½ the yield on a year's dividend of 5½% works out at £5 3s. 3d.%.

It is announced that the recent offer by the Severn Valley Gas Corporation, Ltd., to the proprietors of the Dawley Gas Company has been accepted by the holders of a large majority of the issued share capital. Dawley holders had the option of £13 in cash or 11 Severn Valley ordinary shares of £1 *plus* 12s. 6d. in cash for each Dawley £12 share. The present price of the Severn Valley ordinary shares is 22s. 6d.

Current Sales of Gas Products

The London Market for Tar Products.

July 22.

There are no alterations in the prices of tar products, current prices being as follows:

Pitch is nominal at 35s. per ton f.o.b.

Creosote, about 6d. per gallon.

Refined tar, 4d. per gallon in bulk at makers' works.

Pure toluole, 2s. 2d. to 2s. 3d.; pure benzole, 1s. 7d. to 1s. 8d.; 95/160 solvent naphtha, 1s. 5d.; and 90/160 pyridine, about 4s. 6d. to 4s. 9d.—all per gallon naked at works.

Tar Products in the Provinces.

July 22.

The average prices of gas-works products during the week were: Gas-works tar, 18s. to 23s. Pitch—East Coast, 31s. to 33s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 31s. to 33s.* Toluole, naked, North, 1s. 8d. to 1s. 9d. Coal-tar crude naphtha, in bulk, North, 6¾d. to 7d. Solvent naphtha, naked, North, 1s. 5d. to 1s. 5½d. Heavy naphtha, North, 9½d. to 10½d. Creosote, *ex* works, in bulk, North, liquid and salty, 5½d. to 5¾d.; low gravity, 5d. to 5¼d.; Scotland, 5d. to 5¼d. Heavy oils, in bulk, North, 5d. to 5½d. Carbolic acid, 60's, 1s. 11d. to 2s. Naphthalene, £10 to £11. Salts, 60s. to 75s., bags included. Anthracene, "A" quality, 2¼d. to 3d. per minimum 40%, purely nominal; "B" quality, unsalable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *July* 20.

Glasgow being on holiday during the week under review little or no business has been transacted. Prices in most cases are fairly steady.

Crude gas-works tar.—The actual value is 28s. to 30s. per ton *ex* works in bulk.

Pitch is easier at about 35s. per ton f.o.b. Glasgow for export, while for home trade 35s. per ton *ex* works in bulk is still being quoted.

Refined tar is still quoted freely at 3d. per gallon *ex* works in buyers' packages.

Creosote oil is scarce with enquiries numerous. Specification, 5¼d. to 5¾d. per gallon; low gravity, 5¼d. to 5½d. per gallon; and neutral oil, 5¼d. to 5½d. per gallon; all f.o.r. in bulk.

Cresylic acid is uninteresting, although makers continue to quote the following prices: Pale, 97/99%, 1s. 1½d. to 1s. 2½d. per gallon; dark, 97/99%, 1s. to 1s. 0½d. per gallon; and pale, 99/100%, 1s. 2½d. to 1s. 3½d. per gallon; all *ex* works naked.

Crude naphtha is quietly steady at 4½d. to 5d. per gallon, according to quality and district.

Solvent naphtha.—90/160 grade is 1s. 3½d. to 1s. 4d. per gallon, and 90/190 heavy naphtha is 10½d. to 11½d. per gallon.

Motor benzole is now well covered on contract. The value is 1s. 3d. to 1s. 3½d. per gallon in bulk at makers' works.

Pyridines.—90/160 grade is 5s. 6d. to 6s. per gallon, and 90/140 grade 6s. to 6s. 6d. per gallon.

Benzole Prices.

These are considered to be the market prices for benzole at the present time:

	s. d.		s. d.	
Crude benzole . . .	0 9½	to	0 10	per gallon at works
Motor ,, . . .	1 3	,,	1 3½	,, ,, ,,
90% ,, . . .	1 4	,,	1 4½	,, ,, ,,
Pure ,, . . .	1 7½	,,	1 8	,, ,, ,,

Contracts Advertised To-Day

Lighting Goods (Mantles, Pendants, and Burners).
Salford Corporation. [p. 228.]

Meters.
Salford Corporation. [p. 228.]

Pipes.
Salford Corporation. [p. 228.]

Stores.
Salford Corporation. [p. 228.]

Weighing Machine Testing, &c.
Salford Corporation. [p. 228.]

Gas Undertakings' Results

Montrose.

The report for the year to June 30, 1935, states that the quantity of gas manufactured during the year amounted to 85,565,000 cu.ft., being an increase on the previous year of 2,728,500 cu.ft. The accounts, after deducting the usual depreciations and writing off £177 against tar distillation plant, shows a profit of £4,837, to which is added the sum of £919 brought forward, making £5,756. From this sum the Directors propose to carry to reserve fund (which will then stand at £18,000) £1,000, and recommend a final dividend at the rate of 5%, less income-tax (making a total of 10% for the year), leaving to be carried forward, subject to Directors' remuneration, the balance of £756.

Stirling.

A profit for the year of over £10,000 was reported at the annual meeting of Stirling Gas Light Company. The balance brought forward from last year, after the deduction of final dividends and the amount transferred to the reserve fund, was £9,417, to which falls to be added the balance at credit of revenue account for year to date (£10,789), and the interest on investments (£159) making a total of £20,316, from which has to be deducted the interest and income-tax, leaving a balance of £17,006. Out of this sum there has been paid a dividend on preference shares for the year to May 15, 1935, less tax, £301; and an interim dividend of 4s. 3·597d. per share, less tax, on the original capital, and 5s. per share, less tax, on the new ordinary capital, amounting together to £1,815. This leaves a balance of £14,889, out of which the Directors recommend a final dividend at the rate of 9s. 0·353d. per share, less tax, on the original capital, and 10s. 6d. per share, less tax, on the new ordinary capital, absorbing £3,811; and transferring to reserve fund £1,288, leaving a balance to be carried forward to next year of £9,789. It was reported by the Chairman (Mr. R. K. Common) that the matter of taking over the Bridge of Allan Gas Undertaking was well in hand, but that they would require to borrow £20,000, and it was proposed to do this by an issue of preference shares.

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STOCK AND SHARE LIST

Official Quotations on the London and Provincial Stock Exchanges

Issue. £	Share	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations, July 19.	Rise or Fall on Week.	Transactions, Lowest and Highest Prices During the Week.
1,551,868	Stk.	Mar. 11	7	7	Alliance & Dublin Ord. ...	130—140	...	...
374,000	,,	June 24	4	4	Do. 4 p.c. Deb. ...	90—100	...	...
557,655	,,	Feb. 18	7	7	Barnet Ord. 7 p.c.	169—169½	...	169—169½
300,000	1	Apl. 8	1/4½	1/9½	Bombay, Ltd.	1 7/16—1 11/16	+ 1/16	32/—33/-
178,480	Stk.	Feb. 18	9½	9½	Bournemouth sliding scale ...	225—235	...	...
550,050	,,	,,	7	7	Do. 7 p.c. max. ...	168—173	...	172½
439,160	,,	,,	6	6	Do. 6 p.c. Pref. ...	147—152	...	...
50,000	,,	June 24	3	3	Do. 3 p.c. Deb. ...	85—90	...	...
262,025	,,	,,	4	4	Do. 4 p.c. Deb. ...	106—111	+1	108½
335,000	,,	,,	5	5	Do. 5 p.c. Deb. ...	123—128	...	...
357,900	,,	Feb. 18	7½	7½	Brighton, &c., 6 p.c. Con. ...	173—178	...	176½
649,955	,,	,,	6¾	6¾	Do. 5 p.c. Con. ...	153—158	...	...
205,500	,,	,,	6	6	Do. 6 p.c. B. Pref.	145—150	...	...
1,487,500	,,	July 8	5	5	Bristol, 5 p.c. max.	120—122a*	+1	...
120,420	,,	June 7	4	4	Do. 1st 4 p.c. Deb. ...	100½—102½a	...	...
217,870	,,	,,	4	4	Do. 2nd 4 p.c. Deb. ...	100½—102½a	...	...
328,790	,,	,,	5	5	Do. 5 p.c. Deb.	127—130a	...	...
855,000	,,	Mar. 11	7	8	British Ord.	153—158	...	153—155
100,000	,,	June 7	7	7	Do. 7 p.c. Pref.	160—165	...	...
350,000	,,	,,	5½	5½	Do. 5½ p.c. "B" Cum. Pref.	112—117	...	...
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...	...
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	109—114	...	114½
200,000	,,	,,	...	17/6	Do. 3½ p.c. Red. Deb. ...	99—101	...	...
100,000	10	22 May '33	6	4	Cape Town, Ltd.	1—3	...	...
100,000	10	6 Nov.'33	4½	4½	Do. 4½ p.c. Pref. ...	1—3	...	20/-
150,000	Stk.	June 24	4½	4½	Do. 4½ p.c. Deb. ...	83—88	...	85
626,860	,,	Jan. 21	6	6	Cardiff Con. Ord.	130—135	...	...
237,860	,,	June 7	5	5	Do. 5 p.c. Red. Deb.	107—112	...	...
157,150	,,	Feb. 4	5	6½	Chester 5 p.c. Ord.	111—116b	...	...
98,936	1	Mar. 25	2/-	2/-	Colombo, Ltd., Ord.	1 3/16—1 7/16	...	...
24,500	1	,,	1/4½	1/4½	Do. 7 p.c. Pref. ...	20/6—22/6	...	...
609,204	1	Mar. 25	-/11/48	-/11/48	Colonial Gas Assn. Ltd. Ord.	20/6—22/6	...	21 9
296,053	1	,,	1/3·30	1/3·30	Do. 8 p.c. Pref.	26/—28/-	...	26 10½—27/1½
1,775,005	Stk	Feb. 4	5	6	Commercial Ord.	104—109	...	104—107
620,000	,,	June 7	3	3	Do. 3 p.c. Deb. ...	85—90	...	88
286,344	,,	Feb. 18	5	5	Do. 5 p.c. Deb. ...	123—128	...	125½
807,560	,,	Feb. 18	7	7	Croydon sliding scale... ...	155—160	...	156
569,590	,,	,,	5	5	Do. max. div.	115—120	...	...
620,385	,,	June 24	5	5	Do. 5 p.c. Deb.	123—128	...	...
542,270	,,	Feb. 18	7	10	Derby Con.	185—195c	...	...
55,000	,,	June 24	4	4	Do. 4 p.c. Deb. ...	100—105c	...	...
239,000	,,	Feb. 4	5	5	East Hull Ord. 5 p.c.	108—113	...	...
181,625	,,	Feb. 4	6	6	East Surrey Ord 5 p.c. ...	131—136	...	...
175,609	,,	June 7	5	5	Do. 5 p.c. Deb. ...	123—128	...	...
1,002,180	,,	Mar. 11	†	†7	European, Ltd.	170—180	...	...
19,313,481	,,	Feb. 4	5⅔	5⅔	Gas Light & Coke 4 p.c. Ord.	28/—28 6f	+-/3	28/—28/4½
2,600,000	,,	,,	3⅓	3⅓	Do. 3⅓ p.c. max.	89—92	...	90½
4,477 106	,,	,,	4	4	Do. 4 p.c. Con. Pref. ...	108—111	...	109—110½
8,602,497	,,	June 7	3	3	Do. 3 p.c. Con. Deb. ...	89—92	−½	89½—90½
3,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	115—118	...	117
3,500,000	,,	,,	4½	4½	Do. 4½ p.c. Red. Deb. ...	112—115	...	114—114¾
270,466	,,	Feb. 18	6	6	Harrogate New Cons. ...	135—140	...	...
140,000	1	Mar. 25	1/7½	1/7½	Hongkong & China, Ltd. ...	1½—1¾	...	26/4½
213,200	Stk.	Feb. 18	6	6	Hornsey Con. 3½ p.c.... ...	128—138	...	...
5,600,000	,,	May 13	10	14	Imperial Continental Cap. ...	215—220	...	215½—218
223,130	,,	Jan. 21	3½	3½	Do. 3½ p.c. Red. Debs.	91—96	...	...
285,242	,,	Feb. 18	8½	8½	Lea Bridge 5 p.c. Ord. ...	175—185	...	...
2,167,410	,,	Feb. 18	6	6	Liverpool 5 p.c. Ord.... ...	138—140b	...	...
245,500	,,	June 7	5	5	Do. 5 p.c. Red. Pref. ...	105—110b	...	...
306,083	,,	July 8	4	4	Do. 4 p.c. Deb.	103—106b*	...	...
165,736	,,	Feb. 18	8	10	Maidstone 5 p.c. Cap. ...	185—195	...	...
63,480	,,	June 24	3	3	Do. 3 p.c. Deb. ...	82—87	...	...
75,000	,,	May 27	†10	†10	Malta & Mediterranean ...	212—222	...	...
392,000	—	Apl. 1	5½	5½	Metropolitan (of Melbourne) 5½ p.c. Red. Deb.	100—105	...	105
231,978	Stk.	Feb. 4	5	5	M. S. Utility "C" Cons. ...	110—115	...	...
818,657	,,	,,	4	4	Do. 4 p.c. Cons. Pref.	102—107	...	...
360,075	,,	June 24	4	4	Do. 4 p.c. Deb. ...	103—108	...	...
148,955	,,	,,	5	†5	Do. 5 p.c. Deb. ...	123—128	...	...
125,000	—	July 1	3½	3½	Do. 3½ p.c. Rd. Rg. Bds.	97—100	...	...
675,000	,,	June 24	††3	††3	Montevideo, Ltd.	48—58	...	...
2,061,315	,,	Feb. 18	5	5½	Newcastle & Gateshead Con.	25/6—26/6df	...	...
682,856	,,	,,	4	4	Do. 4 p.c. Pref. ...	106—107d	...	...
776,706	,,	June 7	3½	3½	Do. 3½ p.c. Deb. ...	99—101d	...	...
277,285	,,	Oct. 8	5	5	Do. 5 p.c. Deb. '43 ...	105—107d	...	...
274,000	,,	Feb. 4	5	5	Newport (Mon.) 5 p.c. max....	115—120a	...	...
225,000	,,	Feb. 18	7½	7½	North Middlesex 6 p.c. Con.	165—175	...	...
396,160	,,	Feb. 4	5	5	Northampton 5 p.c. max. ...	105—110	...	...
300,000	,,	Apl. 29	†9	†7	Oriental, Ltd.	167—172	...	167—168
416,617	,,	June 7	8	8	Plym'th & Stonehouse 5 p.c.	162—167	...	164
504,416	,,	Feb. 4	8	8½	Portsm'th Con. Stk. 4 p.c. Std.	173—178	...	...
241,446	,,	,,	5	5	Do. 5 p.c. max. ...	110—115	...	...
114,000	,,	Jan. 21	5	5	Preston 5 p.c. Pref.	108—113	...	...
269,939	1	Apl. 8	...	...	Severn Val. Gas Cor. Ld. Ord.	22/—23/-	...	22/6—23/-
302,781	1	Mar. 25	...	...	,, ,, 4½ p.c. Cum. Pref.	22/—23/-	...	...
1,736,968	Stk.	Feb. 18	6	6	Sheffield Cons.	141—143e	...	...
95,000	,,	June 24	4	4	Do. 4 p.c. Deb.	102—104e	...	...
133,201	,,	Feb. 18	8½	5	Shrewsbury 5 p.c. Ord. ...	142—147	...	...
90,000	10	May 27	†3	†3½	South African	3—4	...	...
1,061,779	1	May 13	1/2½	1/2½	South East'n Gas Cn. Ld. Ord.	27/—29/-	...	28/3—28 9
845,016	1	Mar. 11	-/10½	-/10½	Do. 4½ p.c. Red. Cum. Pref.	22/3—23/3	...	22 9—23/1½
450,000	Stk.	Feb. 4	74/4	4	Do. 4 p.c. Red. Deb. ...	100—103	...	...
6,709,895	,,	Feb. 4	5	6½	South Met. Ord.	124—127	...	124—127
1,135,812	,,	,,	6	6	Do. 6 p.c. Irred. Pf. ...	147—152	...	149
850,000	,,	,,	4	4	Do. 4 p.c. Irred. Pf. ...	107—110	...	108½
1,895,445	,,	June 24	3	3	Do. 3 p.c. Deb. ...	87—90	...	88½
1,000,000	,,	July 8	5	5	Do. 5 p.c. Red. Deb....	112—117*	...	...
209,820	,,	Feb. 18	8½	8½	South Shields Con.	174—176d	...	...
1,543,795	,,	Feb. 18	6	6	South Suburban Ord 5 p.c. ...	130—135	...	132½—133
512,825	,,	,,	5	5	Do. 5 p.c. Pref. ...	121—126	...	...
500,000	,,	,,	4	4	Do. 4 p.c. Pref. ...	105—110	...	...
888,587	,,	June 7	5	5	Do. 5 p.c. Deb. ...	123—128	...	126
250,000	,,	,,	4	4	Do. 4 p.c. Deb. ...	105—110	...	107½
647,740	,,	Feb. 4	5	5	Southampt'n Ord. 5 p.c. max.	116—121	...	...
121,275	,,	June 7	4	4	Do. 4 p.c. Deb.	100—105	...	...
350,000	,,	Feb. 4	5½	5½	Swansea 5½ p.c. Red. Pref. ...	115—120	...	117½—117½
200,000	,,	June 7	6½	6½	Do. 6½ p.c. Red. Deb. ...	98—103	...	...
1,076,490	,,	Feb. 18	6½	6½	Tottenham and District Ord.	148—153	...	150½—154
409,835	,,	,,	5½	5½	Do. 5½ p.c. Pref. ...	131—136	...	...
62,235	,,	,,	5	5	Do. 5 p.c. Pref. ...	120—125	...	...
199,005	,,	June 7	4	4	Do. 4 p.c. Deb. ...	101—106	...	...
369,774	,,	Feb. 4	7	7	Uxbridge, &c., 5 p.c.	150—155	...	...
108,330	,,	,,	5	5	Do. 5 p.c. Pref. ...	118—123	...	...
1,326,700	,,	Feb. 4	7	7	Wandsworth Consolidated ...	155—160	...	154—160
1,371,373	,,	,,	5	5	Do. 5 p.c. Pref. ...	121—126	...	125
1,317,964	,,	June 7	5	5	Do. 5 p.c. Deb. ...	125—130	...	126½
208,300	,,	,,	26/0	4	Do. 4 p.c. Deb. ...	102—107	...	...
156,400	,,	Feb. 18	5	6g	Winchester W.& G. 5 p.c. Con.	116—121	...	...

Quotations at :—*a.*—Bristol. *b.*—Liverpool. *c.*—Nottingham. *d.*—Newcastle. *e.*—Sheffield. *f.*—The quotation is per £1 of Stock. *g.*—Paid £3, including 10s. on account of back dividends. * Ex. div. † Paid free of Income-tax. ‡ For year.

STOCK FOR SALE.

ALFORD GAS COMPANY, ALFORD, LINCS.

THE undermentioned have instructions to place on the Open Market and receive OFFERS for the undermentioned STOCK of the above Company, viz. :—

£500 4% DEBENTURE STOCK
and
£325 CAPITAL STOCK.

Offers to SLATER HEELIS & CO., Solicitors, DISTRICT BANK BUILDINGS, SALE, CHESHIRE.

TROTTER HAINES, & CORBETT LIMITED
BRETTEL'S ESTATE
FIRE-CLAY & BRICK WORKS
STOURBRIDGE

Manufacturers of GAS RETORTS, GLASSHOUSE FURNACE & BLAST FURNACE BRICKS, LUMPS, TILES, and every Description of FIRE BRICKS.

Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.

SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

LONDON OFFICE: E. C. BROWN & CO., LEADENHALL CHAMBERS, 4, ST. MARY AXE, E.C.

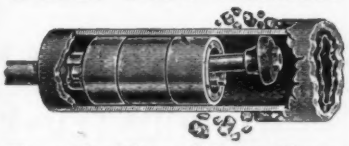
THE BRITISH
GAS PURIFYING MATERIALS
CO. LTD.
LONDON ROAD, LEICESTER.

MODERN PURIFIERS
REQUIRE
EFFICIENT
PURIFYING MATERIALS

ENQUIRIES SOLICITED

SPENT OXIDE WANTED

The "DEAN"
Boiler Tube Cleaner.



The totally different *Vibratory* Cleaner.
For all Water Tube and Fire Tube Boilers.

GREEN & BOULDING, LTD.,
162a, Dalston Lane, London, E.8.

CAST IRON PIPES
FOR
GAS, WATER, & STEAM
1¼in. to 12in. BORE.

THOS. ALLAN & SONS, LTD.,
Bonlea Foundry,
THORNABY-ON-TEES.

Telegrams: "BONLEA, THORNABY-ON-TEES."
Telephone No.: STOCKTON 66121 (Two lines).

FEET

UNIMPORTANT UNACCOUNTED-FOR FEET

OF NO ACCOUNT TO THIS "GUY" BUT OF VITAL IMPORTANCE IN GAS DISTRIBUTION, HENCE THE POPULARITY OF 'A E M' METERS, FOR WHEN IT COMES TO THE MEASUREMENT OF CUBIC FEET OF GAS 'A E M' METERS MISS NO FEET

ALDER & MACKAY LTD.

EDINBURGH, LONDON
BRADFORD & BRANCHES

PUBLISHERS' NOTICE.

TO CORRESPONDENTS: No notice can be taken of anonymous communications, unless authenticated by the name and address of the writer (not necessarily for publication).

TO ADVERTISERS.

NOON ON TUESDAY is the latest hour for receipt of advertisement copy for the following day's issue.

FIRST POST ON MONDAY is the latest for receipt of alterations of standing advertisements.

RATES FOR UNDISPLAYED ADVERTS: Situations Wanted, Six Lines and under (about 36 words), 3s.; each additional Line, 6d. Situations Vacant, Apparatus Wanted and for Sale, Contracts, Public Notices, &c., 9d. per Line—minimum 4s. 6d. An additional charge of 6d. is made where replies are addressed c/o the "JOURNAL."

Full Schedule of Advertising Rates on application.

TERMS OF SUBSCRIPTION.

United Kingdom and Ireland — Advance Rate: 35/- per annum, 18/- per half year. Credit Rate: 40/- per annum, 21/- per half year.

Dominions and Colonies and United States — 35/- per annum, in advance.

Other Countries in the Postal Union — 40/- per annum, in advance.

A copy of the "G.J." Calendar and Directory is presented to Continuous Subscribers.

WALTER KING, LTD., 11, Bolt Court, Fleet Street, London, E.C. 4.
Telephone: Central 2236-7 (2 lines). Telegrams: "GASKING, FLEET LONDON."

60% Sulphur absorbed by our

OXIDE

which has stood the test of 60 years

Minimum Costs, Highest Efficiency

ESTABLISHED 1873

GAS PURIFICATION & CHEMICAL COMPANY LIMITED

PALMERSTON HOUSE, 34, OLD BROAD STREET LONDON, E.C. 2

Telegrams: "Purification, Stock, London." Telephone: London Wall 9144

WEIGHBRIDGES

FOR Motor Lorries and Railway Traffic can be seen erected at our Works READY FOR DELIVERY. Inspection by your Engineer invited and a test by your Local Inspector of Weights and Measures before delivery. Every machine a High-Class Engineering Product and fully guaranteed.

CHARLES ROSS, LIMITED, SHEFFIELD.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E. 1.

WET AND DRY GAS METERS, PREPAYMENT METERS, STATION METERS AND GOVERNORS.

REPAIRS RECEIVE PROMPT ATTENTION.

Telephones: Main (Oldham) 3815/6 and 2412 Hop, London.

Telegrams: "BRADDOCK, OLDHAM," and "METRIQUE, LAMB, LONDON."

FINANCIAL.

A GAS Undertaking is prepared to LEND MONEY to other Statutory Gas or Water Undertakings for short periods at low rates of interest.

Apply, No. 8,551, "GAS JOURNAL," 11, BOLT COURT, FLEET STREET, E.C. 4.

APPOINTMENTS, &c., VACANT.

APPLICATIONS are invited for the Position of ENGINEER, MANAGER, and SECRETARY to a medium-sized Gas Company. Applicants should send *copies* of Testimonials. Salary, £600–£750 per Annum, dependent upon Experience and Ability.

Address, No. 8,554, "GAS JOURNAL," 11, BOLT COURT, FLEET STREET, E.C. 4.

OXIDE OF IRON.

SPENT OXIDE BOUGHT.

BALE & CHURCH, LTD.,
33, ST. MARY-AT-HILL, LONDON, E.C. 3.
Phone: Mansion House 1156.

"TORTO" FIRE CEMENT.

BALE & CHURCH, LTD.,
33, ST. MARY-AT-HILL, LONDON, E.C. 3.
Phone: Mansion House 1156.

"KLEENOFF," THE COOKER CLEANSER
Tins for Sale to Consumers.
In Bulk for Works Use.
(*See also* p. 166, *July* 17, *and the* "*Gas Salesman.*")

BALE & CHURCH, LTD.,
33, ST. MARY-AT-HILL, LONDON, E.C. 3.
Phone: Mansion House 1156.

CHARTERED Gas Engineer required as whole-time Administrative Assistant in Westminster. Position would suit one retired from active works control. Salary, £300 to £400 a year, according to experience.

Address, No. 8,555, "GAS JOURNAL," 11, BOLT COURT, FLEET STREET, E.C. 4.

Continued on next page.

Theory of Industrial Gas Heating

By PETER LLOYD, B.A.Cantab., A.I.C.

This book represents, we believe, the first attempt to work out the general theory of industrial gas application, and it includes information which will be of interest not only to salesmen and students, but also to designers, manufacturers, and users of industrial gas equipment.

Price 6/- post free

WALTER KING, LTD., 11, BOLT COURT, FLEET STREET, LONDON, E.C. 4

ROBERT DEMPSTER & SONS, LTD., ELLAND, Builders of CARBONIZING PLANTS, both Horizontal and Vertical. Manufacturers of CONDENSERS, PURIFIERS, GASHOLDERS, &c., also every description of COAL and COKE HANDLING PLANT. Telegrams: "DEMPSTER, ELLAND." Telephone: ELLAND 261 (Private Branch Exchange).

FIRTH BLAKELEY, SONS, & CO., LTD.,
Vulcan Ironworks, Church Fenton, Yorks.,

MANUFACTURERS of Gasholders, Tanks, Condensers, Purifiers, Scrubbers, Washers, and every description of Gas Plant.
Sole makers of the "P-M" Semi water Gas Plant
Telegrams: "BLAKELEYS, CHURCH FENTON." Telephone: BARKSTON ASH 34 (Private Branch Exchange). Code: "BENTLEYS."

APPOINTMENTS, &c., VACANT.
Continued.

WANTED, by a large Gas Under taking in the South, a CHIEF INSPECTOR of FITTINGS WORK. Must be fully qualified to Take Charge of the Fittings Department.
Applications, accompanied by *copies* of Testimonials, stating Age, Experience, Qualifications, and Salary required, to be sent, in applicant's own handwriting, to No. 8,552, "GAS JOURNAL," 11, BOLT COURT, FLEET STREET, E.C 4.

WANTED, by a large Gas Undertaking in the South of England, a fully qualified MAINS SUPERINTENDENT, with Experience in High and Low Pressure Gas Distribution, and capable of Controlling the Main and Service Laying Departments.
Applications, stating Experience, Training, Age, present Employment, and Salary required, to be sent, in applicant's own handwriting, together with *copies* of recent Testimonials, to No. 8,553, "GAS JOURNAL," 11, BOLT COURT, FLEET STREET, E.C. 4.

RUGBY GAS COMPANY.

ASSISTANT Salesman and Inspector required. Experienced in Canvassing and Advising Consumers. Commencing Salary, £150 per Annum.
Apply, with full particulars of Experience and *copies* of Testimonials, to ENGINEER, GAS OFFICES, RUGBY.

RUGBY GAS COMPANY.

APPLICATIONS are invited for the Position of LADY DEMONSTRATOR of Domestic Gas Appliances. Candidate must be qualified in Cooking and Laundry Work, experienced in Lecturing, and Demonstrating Appliances in consumers' houses. Salary, £150 per Annum.
Applications, stating Age and Experience, and accompanied by not more than three *copies* of Testimonials, to be addressed to the ENGINEER, GAS OFFICES, RUGBY.

RUGBY GAS COMPANY.

WANTED – Works Fitter. Must be Gas-Works trained, with experience of Humphreys & Glasgow C.W.G. Plant. Wages, 1s. 8d. per hour.
Apply, with full particulars of Experience and *copies* of Testimonials to ENGINEER, GAS OFFICES, RUGBY.

COUNTY BOROUGH OF ROCHDALE.
(GAS DEPARTMENT.)

APPLICATIONS are invited for the Position of SALES MANAGER.
Applicants should preferably be holders of an Institution of Gas Engineers Certificate in Gas Supply, and the British Commercial Gas Association's Certificate in Gas Salesmanship, or equivalent qualifications and experience.
The duties of the Sales Manager will include management of the Showroom and the organisation of gas sales propaganda for domestic and industrial purposes. Salary, £350 per annum.
Applications, including *copies* of three recent Testimonials, endorsed "Sales Manager," and addressed to the undersigned, to be received not later than Thursday, August 8th, 1935.
By order,
WM. HENRY HICKSON,
Town Clerk.
Town Clerk's Office,
Town Hall,
Rochdale,
July 19, 1935.

REPRESENTATIVE Wanted for Lancashire District. Must be established and have reasonable technical knowledge of Gas Cookers and Fires.
Write, stating Age, Salary required, and Experience, to SIDNEY FLAVEL & CO., LTD., LEAMINGTON.

CONTRACTS OPEN.

CITY OF SALFORD.

TENDERS are invited for the Supply and Delivery of the undermentioned GOODS, &c., during the Eighteen Months commencing 1st October, 1935:
(1) GAS METERS (ORDINARY and PREPAYMENT).
(2) CAST IRON MAIN PIPES, &c.
(3) IRON CASTINGS.
(4) GAS and STEAM TUBING, &c., including MALLEABLE FITTINGS.
(5) BRASS PENDANTS, BURNERS, &c.
(6) TESTING and REPAIRING of WEIGHING MACHINES.
(7) TINWARE.
(8) DELIVERY HOSE, PACKING, &c.
(9) GAS COCKS.
(10) BOLTS, NUTS, RIVETS, &c.
(11) LEAD (SHEET and PIPE).
(12) GAS MANTLES.

Forms of Tender and further particulars from the Gas Engineer, Gas Offices, Bloom Street, Salford 3, Lancs.
Tenders, in sealed envelopes, endorsed "Tender for Stores," and bearing the number quoted in this advertisement, to be addressed to the Town Clerk, Town Hall, Salford 3.
H. H. TOMSON,
Town Clerk.

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MEWBURN, ELLIS, & CO.,
CHARTERED PATENT AGENTS AND TRADE MARK AGENTS,
70 & 72, Chancery Lane, London, W.C. 2.
Telegrams: "Patent, London." 'Phone: 0137 Holborn.
And 3, St. Nicholas Buildings, Newcastle-on-Tyne.

STEAM ENGINES
TO MEET THE NEEDS
OF EVERY INDUSTRY
ASHWORTH & PARKER LTD
RIVERSIDE WORKS · BURY · LANCS

53, VICTORIA ST.
GUNITE ENGINEERS CONTRACTORS
THE CEMENT-GUN COMPANY LIMITED
ESTABLISHED 1924
LONDON, S.W. 1

"G" BRAND
MALLEABLE TUBE FITTINGS
Accuracy of manufacture and Perfect Joints ensured by Testing under Air Pressure in Water.
Also Manufacture Tools for Gas Engineers, Stocks and Dies, Tube Cutters, Tube Wrenches, and Chain of every description.
JAS. J. GRIFFITHS,
CANAL WHARF WORKS,
NETHERTON, DUDLEY.

DAVID GRANT & Co.
ESTABLISHED 1855.

DRY GAS METERS
STANDARD, HIGH CAPACITY, and SMALL HIGH CAPACITY
STATION METERS, PRESSURE GAUGES, SYPHON PUMPS
SLOT METERS Simple, Strong, Compact, Accurate
1d. or 1s. or Two-Coin
Sole Agents in Scotland for "Renrut" Service Cleansers, etc.
EAST CROSSCAUSEWAY, EDINBURGH
Telegrams: "Dagran Edinburgh." Telephone: Edinburgh 41574